ALTISTART® 48 Soft Start
Taming Energy

Catalogue

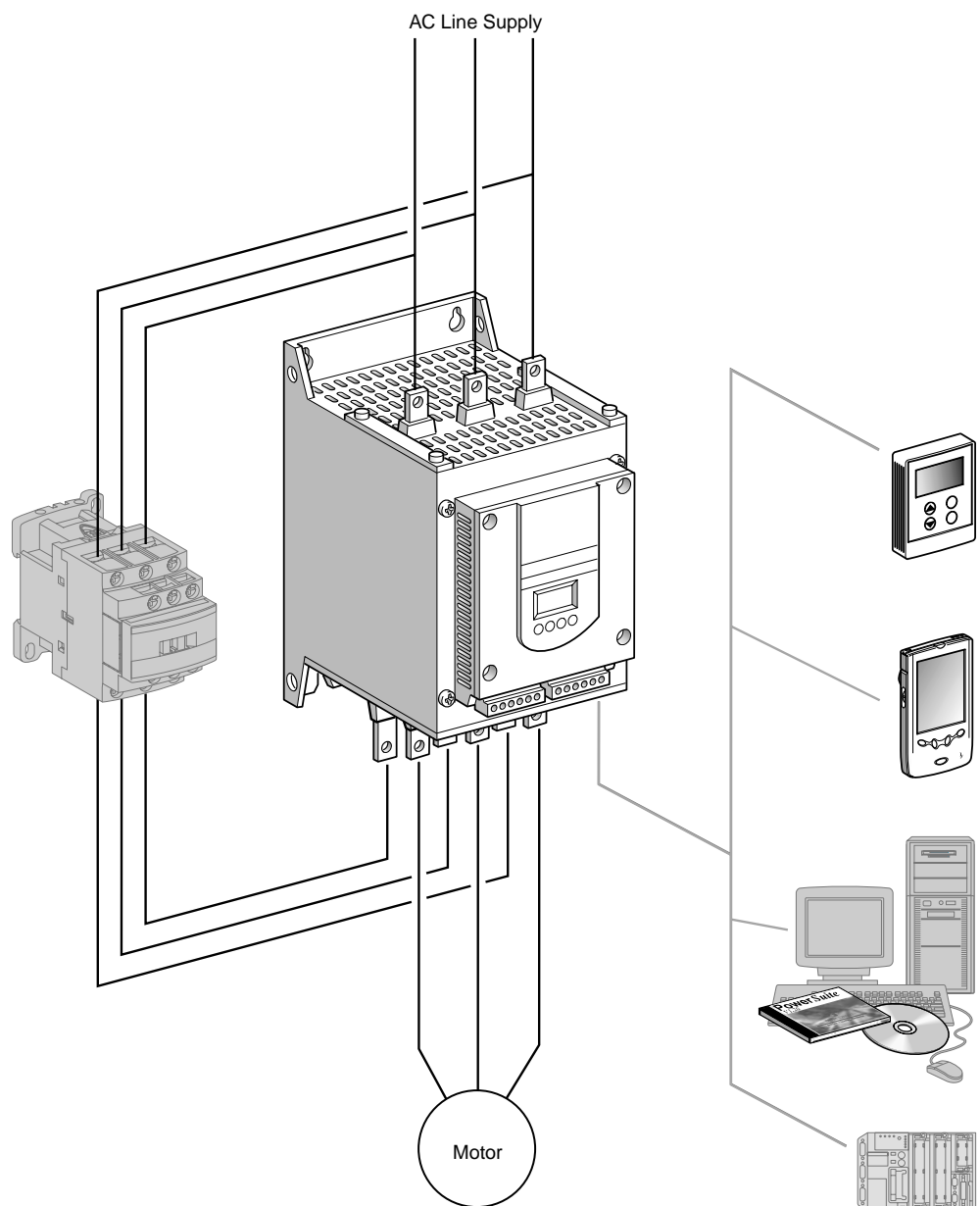September
02

Schneider Electric
Building a New Electric World

Telemecanique

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AC Line Supply

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Applications

The ATS48 Soft Start is a controller with 6 thyristors. It is used for the torque-controlled soft starting and stopping of three-phase squirrel cage asynchronous motors in the power range between 3 and 1200 hp.

It offers soft starting and deceleration functions along with machine and motor protection functions as well as functions for communicating with control systems. These functions are designed for use in state-of-the-art applications in centrifugal machines, pumps, fans, compressors and conveyors, which are primarily used in the construction, food and beverages and chemical industries. The high-performance algorithms of the ATS48 controller contribute significantly to its robustness and ease of setup.

The ATS48 controller is a cost-effective solution which can:

- Reduce machine operating costs by reducing mechanical stress and improving machine availability
- Reduce the stress placed on the electrical distribution system by reducing line current peaks and voltage drops during motor starts

The ATS48 controller is rated for three-phase voltages 208 to 690 V, 50/60 Hz and are dimensioned for standard and severe duty applications.

Functions

The ATS48 controller is supplied ready for use in a standard duty application with Class 10 motor thermal overload protection. All devices include a built-in keypad display which can be used to modify programming, adjustment or monitoring functions in order to adapt and customize the application to meet individual customer requirements.

Soft Start performance functions:

- Exclusive torque control system (patented by Schneider Electric)
- Constant control of the torque supplied to the motor during acceleration and deceleration periods (significantly reducing pressure surges)
- Adjustments for ramp and the starting torque
- The starter can be bypassed using a contactor at the end of the starting period while maintaining electronic overload protection (bypass function)
- Wider frequency tolerance for generator set (source) power supplies

Machine and motor protection functions:

- Built-in motor thermal overload protection
- Processing of information from PTC thermal probes
- Monitoring of the starting time
- Protection against underloads and overcurrents during continuous operation

Extended I/O functions for integration into control systems:

- 4 logic inputs, 2 logic outputs, 3 relay outputs and 1 analog output
- Pull-apart terminal connectors
- Function for configuring a second set of motor parameters and easy-to-adapt settings
- Display of electrical values, running conditions and operating time
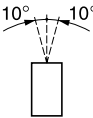- RS-485 serial link for connection to MODBUS® System

Options

A remote keypad display can be mounted on the door of a wall-mounted or floor-standing enclosure.

POWERSUITE® advanced dialog solutions:

- POWERSUITE® Pocket PC/PDA with PPC type terminal.
- POWERSUITE® software workshop. (Version 1.30, build 5 or higher)
- A range of wiring accessories for connecting the starter to PLCs via a MODBUS® Systems connection.
- Bus communication and Ethernet, FIPIO®, DEVICENET™ and PROFIBUS® DP network communication options.

Characteristics: pages 4 to 7   Dimensions: pages 17 to 18   Wiring Diagrams: pages 21 to 24

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Environment

Conformity to standards			The electronic starters have been developed and performance tested in accordance with international standards, in particular with the starter product standard EN/IEC 60947-4-2.
CE marking			Products have CE marking in accordance with the harmonized standard EN/IEC 60947-4-2.
Product approvals			UL, CSA Pending: DNV, C-Tick, Ghost, CCIB
Degree of protection	Starters ATS48D17Y to 48C11Y		IP 20 (IP 00 in the absence of connections)
	Starters ATS48C14Y to 48M12Y (1)		IP 00
Vibration resistance	Conforming to IEC 60068-2-6		1.5 mm from 2 to 13 Hz 1 g from 13 to 200 Hz
Shock resistance	Conforming to IEC 60068-2-27		15 g for 11 ms
Starter noise level (2)	Starters ATS48D32Y to D47Y	dBA	52
	Starters ATS48D62Y to C11Y	dBA	58
	Starters ATS48C14Y to C17Y	dBA	50
	Starters ATS48C21Y to C32Y	dBA	54
	Starters ATS48C41Y to C66Y	dBA	55
	Starters ATS48C79Y to M12Y	dBA	60
Fans	Starters ATS48D17Y and D22Y		Natural convection
	Starters ATS48D32Y to M12Y		Forced convection. The fans are activated automatically when a temperature threshold is reached. For flow rate see page 20.
Ambient temperature around the unit	Operation		14 to 104 ˚F (-10 to 40 ˚C) without derating Up to 140 ˚F (60 ˚C), derate the current by 2% for each ˚C above 40 ˚C 14 to 122 ˚F (-10 to 50 ˚C) with user supplied shorting/bypass contactor
	Storage, conforming to IEC 60947-4-2		-13 to 158 ˚F (- 25 to 70 ˚C)
Maximum relative humidity	Conforming to IEC 60068-2-3		95% without condensation or dripping water
Maximum ambient pollution	Conforming to IEC 60664-1		Level 3
Maximum operating altitude		ft (m)	3300 ft (1000 m) without derating [above this, derate the nominal current of the ALTISTART by 2.2% for each additional 330 ft (100 m)] to a maximum of 6600 ft (2000 m).
Operating position Maximum permanent angle in relation to the normal vertical mounting position			10° ←	→ 10°

Electrical characteristics

Operating category	Conforming to IEC 60947-4-2		AC-53a
Three-phase supply voltage	Starters ATS48●●●Y	V	208 - 15% to 690 + 10%
Frequency		Hz	50/60 ± 5% (automatic) 50 or 60 ± 20% (must be set)
Nominal starter current	Starters ATS48●●●Y	A	17 to 1200
SCRs	Starters ATS48●●●Y	PIV	1800
Motor power	Starters ATS48●●●Y	kW/HP	5.5 to 900/5 to 1200
Voltage indicated on the motor rating plate	Starters ATS48●●●Y	V	208 to 690
Starter control circuit supply voltage	Starters ATS48●●●Y	V	110 - 15% to 230 + 10%, 50/60 Hz
Maximum control circuit consumption (with fans operating)	Starters ATS48D17Y to C17Y	W	30
	Starters ATS48C21Y to C32Y	W	50
	Starters ATS48C41Y to M12Y	W	80
Relay output (2 configurable outputs)			3 relay outputs (R1, R2, R3), normally open contacts 1"N/O". Minimum switching capacity: 10 mA for 6 Vdc. Maximum switching capacity on inductive load: 1.8 A for 230 Vac and 30 Vdc (power factor= 0.5 and L/R=20 ms). Maximum nominal operating voltage 400 Vac. Factory setting: R1 assigned as the "fault relay" (configurable) R2 assigned as the "end of starting relay" to control the starter bypass relay R3 assigned as "motor powered" (configurable)

(1) Protective covers can be fitted to the power terminals of ATS48C14Y to C32Y starters. ATS48C41Y to 48M12Y starters have protection on the front panel and on the sides.

(2) Starters located 3 ft. (1 m) away. The noise levels may change depending on the characteristics of the fans.

Characteristics: pages 4 to 7	Dimensions: pages 17 to 18	Wiring Diagrams: pages 21 to 24

Electrical characteristics (continued)

Logic inputs LI (2 configurable inputs)	4 logic inputs, impedance 4.3 kΩ, isolated: Stop, Run, LI3, LI4. + 24 V power supply (maximum 30 V) I max. 8 mA State 0 if U < 5 V and I < 2 mA State 1 if U > 11 V and I > 5 mA
Internal source available	One 24 V output, isolated and protected against short-circuits and overloads. Accuracy ± 25%. Max. current 200 mA.
Logic outputs LO (configurable)	2 logic outputs LO1 and LO2 with 0 V common, compatible with level 1 PLC, according to standard IEC 65A-68. + 24 V power supply (minimum: +12 V, maximum: + 30 V). Maximum output current: 200 mA if supplied externally
Analog output AO (configurable)	Current output 0-20 mA or 4-20 mA Maximum load impedance: 500 Ω Accuracy ± 5% of the maximum value
Input for PTC probe	Total resistance of probe circuit 750 Ω at 25˚C, according to IEC 60 738-A
Maximum I/O connection capacity	12 AWG (2.5 mm²)
Communication	RS-485 multidrop serial link integrated in the starter, for MODBUS® Systems, with RJ45 type connector Transmission speed 4800, 9600 or 19200 bps Maximum number of ATS48 controller's connected: 18 Other uses: - connection to a remote keypad display or - connection to a PC or - connection to other buses and networks via communication options.
Protection — Thermal	Built-in, starter and motor (calculated and/or thermal protection with PTC probes)
Protection — Line protection	Phase failure, indicated by output relay
Current settings	The nominal motor current In can be adjusted from 0.4 to 1.3 times the starter nominal current. Adjustment of the maximum starting current from 1.5 to 7 times the motor In, limited to 5 times the starter nominal current.
Starting mode	By torque control with starter current limited to 5 In maximum. Factory setting: 4 In for standard operation on 15 s torque ramp
Stopping mode — Freewheel stop	"Freewheel" stop (factory setting)
Stopping mode — Controlled stop on torque ramp	Programmed between 0.5 and 60 s (for pump applications)
Stopping mode — Braked stop	Controlled dynamically by the flux

Electromagnetic compatibility EMC (1)

	Standards	Test levels	Examples (sources of interference)
Summary of immunity tests carried out with the ATS48 Soft Start	IEC 61000-4-2 level 3 Electrostatic discharge: - by contact - in the air	 6 kV 8 kV	Contact off an electrically charged individual
	IEC 61000-4-3 level 3 Radiated electromagnetic fields	10 V/m	Equipment transmitting radio frequencies
	IEC 61000-4-4 level 4 Rapid electrical transients: - power supply cables - control cables	 4 kV 2 kV	Opening/closing of a contactor
	IEC 61000-4-5 level 3 Shock wave: - phase/phase - phase/ground	 1 kV 2 kV	-
	IEC 61000-4-12 level 3 Damped oscillating waves	1 kV - 1 M Hz	Oscillating circuit on the line supply
Radiated and conducted emissions	According to IEC 60947-4-2, class A, on all starters		
	According to IEC 60947-4-2, class B, on starters up to 170 A: ATS48D17● to 48C17●. Must be bypassed at the end of starting.		

(1) The starters conform to IEC 60947-4-2 (EMC). This standard ensures a level of immunity for products and a level of emitted interference. In steady state, the interference emitted is below that required by the standard.

NOTE:

- *Power factor correction capacitors can only be used upstream of the ALTISTART and only powered up at the end of starting.*

- *The starter must be grounded to conform to the regulations concerning leakage currents (≤ 30 mA). If the installation involves several starters on the same line supply, each starter must be grounded separately.*

TORQUE CHARACTERISTICS

Curves indicating changes in the torque depending on the starting current of a three-phase asynchronous motor.

Curves 1: full voltage starting
Curves 2: starting in current limiting mode

Torque curve Ts1 indicates the total torque range available depending on the limiting current Is1. Limiting the starting current Is to a preset value Is1 will reduce the starting torque Ts1 to a value which is almost equal to the square of currents Is1/Is.
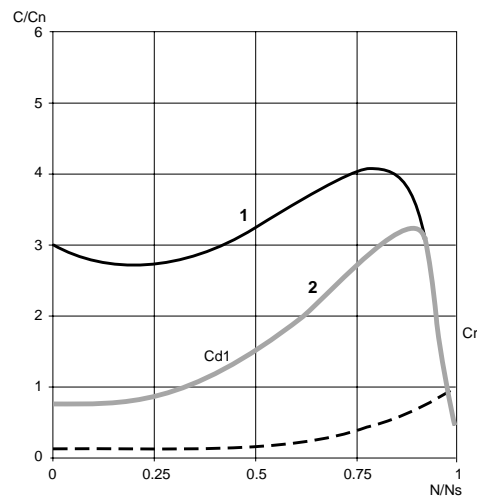
Example:
For motor characteristics: Ts = 3 Tn for Is = 6 In,
limit the current to Is1 = 3 In (0.5 Is)
resulting in a starting torque Ts1 = Ts x (0.5)Σ = 3 Tn x 0.25 = 0.75 Tn
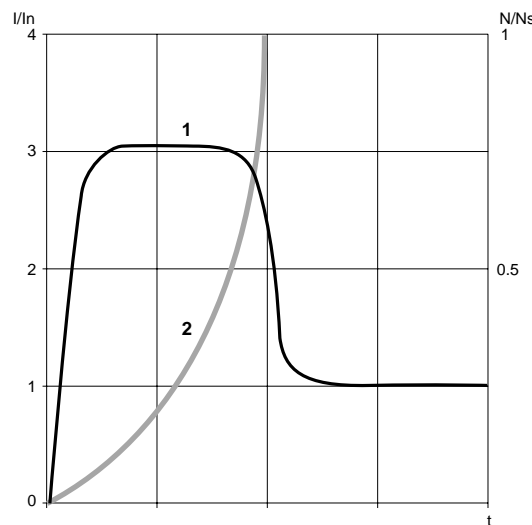
STARTING CURRENT
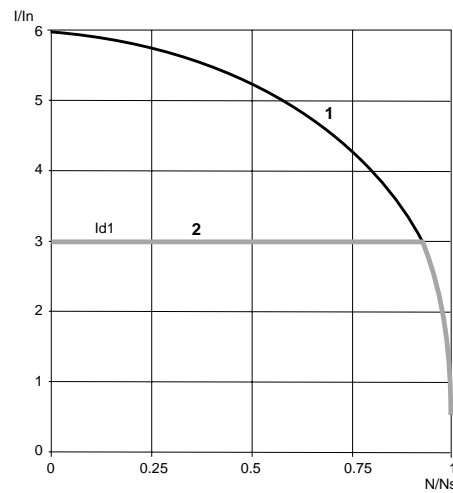
1) Full voltage starting current
2) Starting current limited to Is1

STARTING TORQUE TS1

1) Full voltage starting torque
2) Starting torque with current limited to Is1

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CONVENTIONAL STARTING USING CURRENT LIMITATION OR VOLTAGE RAMP

With current limitation Is1, the accelerating torque applied to the motor is equal to the motor torque Ts1 minus the resistive torque Tr. The accelerating torque increases in the starting range as the speed changes and is at its highest at the end of acceleration (curve 2). This characteristic means that the load is taken up very abruptly, which is not recommended for pump type applications.

Example of speed curve for starting with current limitation

1) Current applied to the motor (I/In)
2) Motor speed N/Ns

STARTING WITH THE ATS48 SOFT START
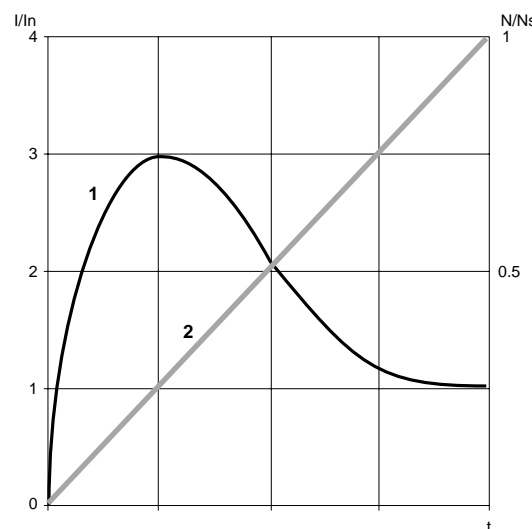
Torque control on the ATS48 controller applies the torque to the motor during the entire starting phase if the current required (curve 1) does not exceed the limiting current. The accelerating torque can be virtually constant over the entire speed range (curve 2). It is possible to set the ALTISTART in order to obtain a high torque on starting for a rapid motor speed rise while limiting its temperature rise, and a lower accelerating torque at the end of starting for gradual loading. This control function is ideal for centrifugal pumps or for machines with high resistive torque on starting.

Example of speed curve for starting with torque control

1) Current applied to the motor (I/In)
2) Motor speed N/Ns

STOPPING WITH THE ATS48 SOFT START

- Freewheel stop: the motor comes to a freewheel stop.
- Decelerated stop: this type of stop is ideal for pumps and can be used to effectively reduce pressure surges. Torque control on the ATS48 controller reduces the effect of hydraulic transients even if the load increases. This type of control makes adjustment easy.
- Braked stop: this type of stop is suitable for high inertia applications because it reduces the stopping time of the machine.

SELECTION CRITERIA FOR AN ATS48 SOFT START UNIT

The ATS48 controller must be selected on the basis of 3 main criteria:

- Low voltage power supply range acceptable for selection:
    - Three-phase AC voltage: 208 - 690 V
- The power and the nominal current (motor FLA) indicated on the motor nameplate
- The type of application and the operating cycle:
  To simplify selection, the applications are categorized as 2 types:
    - Standard duty applications
    - Severe duty applications

Standard or severe duty applications define the limiting values of the current and the duty cycle ratings.

Standard duty application

In standard duty applications, the ATS48 controller is designed to provide:

- Starting at 4x In for 23 seconds or at 3x In for 46 seconds from a cold state
- Starting at 3x In for 23 seconds or at 4x In for 12 seconds with a load factor of 50% and 10 starts per hour or an equivalent thermal cycling

The motor thermal protection conforms to Class 10 overload protection (see page 28).

Example: Centrifugal pump

Severe duty application

In severe duty applications, the ATS48 controller is designed to provide:

- Starting at 4x In for 48 seconds or at 3x In for 90 seconds from a cold state
- Starting at 4x In for 25 seconds with a load factor of 50% and 5 starts per hour or an equivalent thermal cycling

The motor thermal protection conforms to Class 20 overload protection (see page 28).

Example: Grinder

Selecting the starter

Once the appropriate application has been selected from the following page, select the starter from pages 12 to 13 according to the supply voltage and the motor power.

Caution:

If the ATS48 Soft Start is installed inside an enclosure, observe the mounting and derating recommendations (see pages 19 to 20).

APPLICATION AREAS

Depending on the type of machine, the applications are categorized as standard or severe duty based on the starting characteristics, which are given by example, in the table below.

Type of machine	Application	Functions performed by the ATS48 Controller	Starting current (% In)	Starting time (s)
Centrifugal pump	Standard	Deceleration (reduction in pressure surges) Protection against underloads or inversion of the phase rotation direction	300	5 to 15
Piston pump	Standard	Control of running dry and direction of rotation of the pump	350	5 to 10
Fan	Standard Severe if > 30 s	Detection of overloads caused by clogging or underloads (motor fan transmission broken) Braking torque on stopping	300	10 to 40
Cold compressor	Standard	Protection, even for special motors	300	5 to 10
Screw compressor	Standard	Protection against inversion of direction of phase rotation Contact for automatic draining on stopping	300	3 to 20
Centrifugal compressor	Standard Severe if > 30 s	Protection against inversion of direction of phase rotation Contact for automatic emptying on stopping	350	10 to 40
Piston compressor	Standard	Protection against inversion of direction of phase rotation Contact for automatic emptying on stopping	350	5 to 10
Conveyor, transporter	Standard	Overload control for detecting faults or underload control for detecting breaks	300	3 to 10
Lifting screw	Standard	Overload control for detecting hard spots or underload control for detecting breaks	300	3 to 10
Drag lift	Standard	Overload control for detecting jamming or underload control for detecting breaks	400	2 to 10
Lift	Standard	Overload control for detecting jamming or underload control for detecting breaks Constant starting with variable load	350	5 to 10
Circular saw, band saw	Standard Severe if > 30 s	Braking for fast stop	300	10 to 60
Pulper, butchery knife	Severe	Torque control on starting	400	3 to 10
Agitator	Standard	The current display indicates the density of the product	350	5 to 20
Mixer	Standard	The current display indicates the density of the product	350	5 to 10
Grinder	Severe	Braking to limit vibrations during stopping, overload control to detect jamming	450	5 to 60
Crusher	Severe	Braking to limit vibrations during stopping, overload control to detect jamming	400	10 to 40
Refiner	Standard	Torque control on starting and stopping	300	5 to 30
Press	Severe	Braking to increase the number of cycles	400	20 to 60

SPECIAL USES

Other criteria can influence the selection of the ATS48 controller:

Shorting/Bypass contactor

Refer to the recommended wiring diagrams on pages 21 to 24.

The starter can be bypassed by a contactor at the end of starting (to limit the heat dissipated by the starter). The shorting/bypass contactor is controlled by the starter and the current measurements and thermal protection remains active when the starter is bypassed.

Multi Motors

Motors may be connected in parallel provided that the power limit of the starter is not exceeded (the sum of the motor currents must not exceed the nominal current of the starter selected depending on the type of application). Individual thermal protection is required for each motor.

Brush motor

The ATS48 controller can operate with a bypassed stator resistance motor or with a resistance lug. The starting torque is modified in accordance with the rotor resistance. If necessary, maintain a low resistance in order to obtain the required torque to overcome the resistive torque on starting.

A bypassed brush motor has a very low starting torque. A high stator current is required to obtain the sufficient starting torque.

Oversize the starter in order that the value of the limiting current is 7 times that of the nominal current.

NOTE: Ensure that the starting torque of the motor, equal to 7 times the nominal current, is greater than the resistive torque.

NOTE: The ATS48 Soft Start torque control enables excellent soft starting despite the limiting current being 7 times the nominal current required to start the motor.

2-speed motor

The ATS48 controller can operate with a 2-speed motor. A motor demagnetization period must elapse before changing from low speed to high speed in order to avoid antiphase between the line supply and the motor, which would generate very high currents.

Select the starter using the 3 main criteria, see page 8.

Long motor cable lengths

Very long motor cables cause voltage drops due to the resistance of the cable. If the voltage drop is significant, it could affect the current consumption and the torque available. This criteria must be taken into account when selecting the motor and the starter.

Miscellaneous application precautions

Note: Do not use the ATS48 controller upstream of loads other than motors (for example transformers and resistors type loads).

Do not connect power factor correction capacitors to the terminals of a motor controlled by an ATS48 Soft Start.

PRESENTATION

The ATS48 controller can be connected directly to the MODBUS® System using an RJ45 connector and communicates using the RS-485 serial link (2-wire) and the MODBUS® Systems RTU protocol. The communication function provides access to the configuration, adjustment, control and signalling functions of the starter.
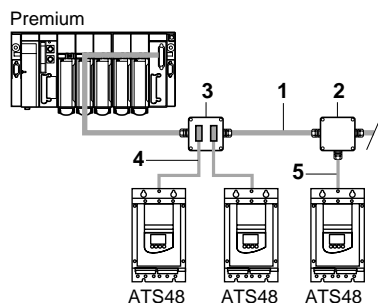
1. MODBUS® Systems cable **TSXSCA●00**
2. Junction box **TSXSCA50**
3. Subscriber sockets **TSXSCA62**
4. MODBUS® Systems drop cable **VW3A8306**
5. MODBUS® Systems drop cable **VW3A8306D30**
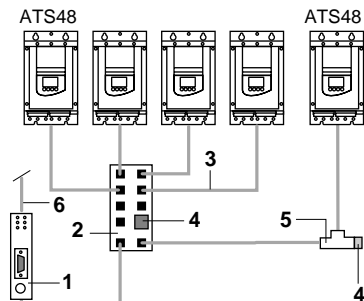
1. Communication module
2. MODBUS® Systems hub **LU9GC3**
3. MODBUS® Systems drop cable **VW3A8306R●●**
4. Line terminator **VW3A8306RC**
5. MODBUS® Systems T-junction box **VW3A8306TF3**
6. To other buses or networks

The ATS48 controller can be connected to other buses or networks using the communication modules and accessories below.

174CEV30010

LUFP1

Communication modules	Cables to be connected	Catalog number	Weight lb (kg)
Ethernet/MODBUS® Systems bridge with 1 x Ethernet 10baseT port (RJ45 type)	To be connected using cable VW3P10306R10	**174CEV30010**	1.10 (0.50)
FIPIO®/MODBUS® Systems gateway	To be connected using cables VW3A8306R●●	**LUFP1 ▲**	0.53 (0.24)
DEVICENET™/MODBUS® Systems gateway	To be connected using cables VW3A8306R●●	**LUFP9 ▲**	0.53 (0.24)
PROFIBUS® DP/MODBUS® Systems gateway	To be connected using cable VW3P07306R10	**LA9P307**	0.53 (0.24)
Connection accessories	**Connectors**	**Catalog number**	**Weight lb (kg)**
Junction box (to be connected with cable VW3A8306D30)	3 screw terminals	**TSXSCA50**	1.15 (0.52)
2-channel subscriber sockets (to be connected with cable VW3A8306)	2 15-way female SUB-D connectors and 2 screw terminals	**TSXSCA62**	1.26 (0.57)
MODBUS® Systems hub	8 RJ45 connectors	**LU9GC3 ▲**	1.10 (0.50)
Line terminator	–	**VW3A8306RC**	–
MODBUS® Systems T-junction box	–	**VW3A8306TF3**	–

Connecting cables				
For bus and networks	**Length (m)**	**Connectors**	**Catalog number**	**Weight lb (kg)**
MODBUS® Systems	3	1 RJ45 connector and one end stripped	**VW3A8306D30**	0.33 (0.15)
	3	1 RJ45 connector and 1 15-way male SUB-D connector	**VW3A8306**	0.33 (0.15)
FIPIO®, DEVICENET™ MODBUS® Systems	0.3	2 RJ45 connectors	**VW3A8306R03**	0.11 (0.05)
	1	2 RJ45 connectors	**VW3A8306R10**	0.11 (0.05)
	3	2 RJ45 connectors	**VW3A8306R30**	0.33 (0.15)
PROFIBUS® DP	1	2 RJ45 connectors	**VW3P07306R10**	0.11 (0.05)
Ethernet	1	2 RJ45 connectors	**VW3P10306R10**	0.11 (0.05)

▲ Contact your local Square D sales office for availability.

Characteristics: pages 4 to 7   Dimensions: pages 17 to 18   Wiring Diagrams: pages 21 to 24

Line Voltage 208 to 690 V, Motor Power in HP

For standard duty applications

Motor				Starter 208 to 690 V - 50/60 Hz				
Motor power (1)				Nominal current (IcL) (2)	Factory setting current (4)	Power dissipated at nominal load	Catalog number	Weight
208 V	230 V	460 V	575 V	A	A	W		lb (kg)
HP	HP	HP	HP	A	A	W		lb (kg)
3	5	10	15	17	14	59	ATS48D17YU	10.8 (4.9)
5	7.5	15	20	22	21	74	ATS48D22YU	10.8 (4.9)
7.5	10	20	25	32	27	104	ATS48D32YU	10.8 (4.9)
10	–	25	30	38	34	116	ATS48D38YU	10.8 (4.9)
–	15	30	40	47	40	142	ATS48D47YU	10.8 (4.9)
15	20	40	50	62	52	201	ATS48D62YU	18.3 (8.3)
20	25	50	60	75	65	245	ATS48D75YU	18.3 (8.3)
25	30	60	75	88	77	290	ATS48D88YU	18.3 (8.3)
30	40	75	100	110	96	322	ATS48C11YU	18.3 (8.3)
40	50	100	125	140	124	391	ATS48C14YU	27.3 (12.4)
50	60	125	150	170	156	479	ATS48C17YU	27.3 (12.4)
60	75	150	200	210	180	580	ATS48C21YU	40.1 (18.2)
75	100	200	250	250	240	695	ATS48C25YU	40.1 (18.2)
100	125	250	300	320	302	902	ATS48C32YU	40.1 (18.2)
125	150	300	350	410	361	1339	ATS48C41YU	113.3 (51.4)
150	–	350	400	480	414	1386	ATS48C48YU	113.3 (51.4)
–	200	400	500	590	477	1731	ATS48C59YU	113.3 (51.4)
200	250	500	600	660	590	1958	ATS48C66YU	113.3 (51.4)
250	300	600	800	790	720	2537	ATS48C79YU	253.6 (115.0)
350	350	800	1000	1000	954	2865	ATS48M10YU	253.6 (115.0)
400	450	1000	1200	1200	1170	3497	ATS48M12YU	253.6 (115.0)

ATS48D17YU

ATS48C14YU

For severe duty applications

Motor				Starter 208 to 690 V - 50/60 Hz				
Motor power (1)				Nominal current (3)	Factory setting current (4)	Power dissipated at nominal load	Catalog number	Weight
208 V	230 V	460 V	575 V	A	A	W		lb
HP	HP	HP	HP	A	A	W		lb
2	3	7.5	10	12	14	46	ATS48D17YU	10.8 (4.9)
3	5	10	15	17	21	59	ATS48D22YU	10.8 (4.9)
5	7.5	15	20	22	27	74	ATS48D32YU	10.8 (4.9)
7.5	10	20	25	32	34	99	ATS48D38YU	10.8 (4.9)
10	–	25	30	38	40	116	ATS48D47YU	10.8 (4.9)
–	15	30	40	47	52	153	ATS48D62YU	18.3 (8.3)
15	20	40	50	62	65	201	ATS48D75YU	18.3 (8.3)
20	25	50	60	75	77	245	ATS48D88YU	18.3 (8.3)
25	30	60	75	88	96	252	ATS48C11YU	18.3 (8.3)
30	40	75	100	110	124	306	ATS48C14YU	27.3 (12.4)
40	50	100	125	140	156	391	ATS48C17YU	27.3 (12.4)
50	60	125	150	170	180	468	ATS48C21YU	40.1 (18.2)
60	75	150	200	210	240	580	ATS48C25YU	40.1 (18.2)
75	100	200	250	250	302	695	ATS48C32YU	40.1 (18.2)
100	125	250	300	320	361	1017	ATS48C41YU	113.3 (51.4)
125	150	300	350	410	414	1172	ATS48C48YU	113.3 (51.4)
150	–	350	400	480	477	1386	ATS48C59YU	113.3 (51.4)
–	200	400	500	590	590	1731	ATS48C66YU	113.3 (51.4)
200	250	500	600	660	720	2073	ATS48C79YU	253.6 (115.0)
250	300	600	800	790	954	2225	ATS48M10YU	253.6 (115.0)
350	350	800	1000	1000	1170	2865	ATS48M12YU	253.6 (115.0)

ATS48M12YU

(1) Value indicated on the motor rating plate.
(2) Corresponds to the maximum permanent current in Class 10. IcL corresponds to the starter rating.
(3) Corresponds to the maximum permanent current in Class 20.
(4) The factory setting current corresponds to the value of the nominal current of a standard motor according to Canadian Electrical Code, 460 V, Class 10 (standard application). Adjust the settings in accordance with the motor nominal current.

Line Voltage 208 to 690 V, Motor Power in kW

For standard duty applications

Motor							Starter 208 to 690 V - 50/60 Hz				
Motor power (1)							Nominal current (IcL) (2)	Factory setting current (4)	Power dissipated at nominal load	Catalog number	Weight
230 V	400 V	440 V	500 V	525 V	660 V	690 V					
kW	kW	kW	kW	kW	kW	kW	A	A	W		lb
4	7.5	7.5	9	9	11	15	17	14	59	ATS48D17YU	10.8 (4.9)
5.5	11	11	11	11	15	18.5	22	21	74	ATS48D22YU	10.8 (4.9)
7.5	15	15	18.5	18.5	22	22	32	27	104	ATS48D32YU	10.8 (4.9)
9	18.5	18.5	22	22	30	30	38	34	116	ATS48D38YU	10.8 (4.9)
11	22	22	30	30	37	37	47	40	142	ATS48D47YU	10.8 (4.9)
15	30	30	37	37	45	45	62	52	201	ATS48D62YU	18.3 (8.3)
18.5	37	37	45	45	55	55	75	65	245	ATS48D75YU	18.3 (8.3)
22	45	45	55	55	75	75	88	77	290	ATS48D88YU	18.3 (8.3)
30	55	55	75	75	90	90	110	96	322	ATS48C11YU	18.3 (8.3)
37	75	75	90	90	110	110	140	124	391	ATS48C14YU	27.3 (12.4)
45	90	90	110	110	132	160	170	156	479	ATS48C17YU	27.3 (12.4)
55	110	110	132	132	160	200	210	180	580	ATS48C21YU	40.1 (18.2)
75	132	132	160	160	220	250	250	240	695	ATS48C25YU	40.1 (18.2)
90	160	160	220	220	250	315	320	302	902	ATS48C32YU	40.1 (18.2)
110	220	220	250	250	355	400	410	361	1339	ATS48C41YU	113.3 (51.4)
132	250	250	315	315	400	500	480	414	1386	ATS48C48YU	113.3 (51.4)
160	315	355	400	400	560	560	590	477	1731	ATS48C59YU	113.3 (51.4)
–	355	400	–	–	630	630	660	590	1958	ATS48C66YU	113.3 (51.4)
220	400	500	500	500	710	710	790	720	2537	ATS48C79YU	253.6 (115.0)
250	500	630	630	630	900	900	1000	954	2865	ATS48M10YU	253.6 (115.0)
355	630	710	800	800	–	–	1200	1170	3497	ATS48M12YU	253.6 (115.0)

For severe duty applications

Motor							Starter 208 to 690 V - 50/60 Hz				
Motor power (1)							Nominal current (3)	Factory setting current (4)	Power dissipated at nominal load	Catalog number	Weight
230 V	400 V	440 V	500 V	525 V	660 V	690 V					
kW	kW	kW	kW	kW	kW	kW	A	A	W		lb
3	5.5	5.5	7.5	7.5	9	11	12	14	46	ATS48D17YU	10.8 (4.9)
4	7.5	7.5	9	9	11	15	17	21	59	ATS48D22YU	10.8 (4.9)
5.5	11	11	11	11	15	18.5	22	27	74	ATS48D32YU	10.8 (4.9)
7.5	15	15	18.5	18.5	22	22	32	34	99	ATS48D38YU	10.8 (4.9)
9	18.5	18.5	22	22	30	30	38	40	116	ATS48D47YU	10.8 (4.9)
11	22	22	30	30	37	37	47	52	153	ATS48D62YU	18.3 (8.3)
15	30	30	37	37	45	45	62	65	201	ATS48D75YU	18.3 (8.3)
18.5	37	37	45	45	55	55	75	77	245	ATS48D88YU	18.3 (8.3)
22	45	45	55	55	75	75	88	96	252	ATS48C11YU	18.3 (8.3)
30	55	55	75	75	90	90	110	124	306	ATS48C14YU	27.3 (12.4)
37	75	75	90	90	110	110	140	156	391	ATS48C17YU	27.3 (12.4)
45	90	90	110	110	132	160	170	180	468	ATS48C21YU	40.1 (18.2)
55	110	110	132	132	160	200	210	240	580	ATS48C25YU	40.1 (18.2)
75	132	132	160	160	220	250	250	302	695	ATS48C32YU	40.1 (18.2)
90	160	160	220	220	250	315	320	361	1017	ATS48C41YU	113.3 (51.4)
110	220	220	250	250	355	400	410	414	1172	ATS48C48YU	113.3 (51.4)
132	250	250	315	315	400	500	480	477	1386	ATS48C59YU	113.3 (51.4)
160	315	355	400	400	560	560	590	590	1731	ATS48C66YU	113.3 (51.4)
–	355	400	–	–	630	630	660	720	2073	ATS48C79YU	253.6 (115.0)
220	400	500	500	500	710	710	790	954	2225	ATS48M10YU	253.6 (115.0)
250	500	630	630	630	900	900	1000	1170	2865	ATS48M12YU	253.6 (115.0)

(1) Value indicated on the motor rating plate.
(2) Corresponds to the maximum permanent current in Class 10. IcL corresponds to the starter rating.
(3) Corresponds to the maximum permanent current in Class 20.
(4) The factory setting current corresponds to the value of the nominal current of a standard motor according to CEC, 460 V, Class 10 (standard application). Adjust the settings in accordance with the motor nominal current.

ALTISTART® 48 Soft Start
Options: Remote Keypad Display, Protective Covers, Line Reactors

REMOTE KEYPAD DISPLAY

VW3G48101

The keypad display can be mounted on the door of a wall-mounted or floor-standing enclosure. It has the same signalling display and configuration buttons as the keypad display integrated in the starter. A switch to lock access to the menu is located at the rear of the keypad display.

The option includes:

- the remote keypad display
- a mounting kit containing a cover, screws and an IP 54 seal on the front panel
- a 9.82 ft. (3 m) connecting cable with a 9-pin SUB-D connector for connecting to the keypad display and an RJ45 connector for connecting to the ATS48 controller.
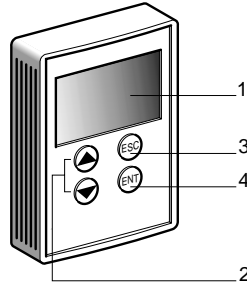
1. Information is displayed in the form of codes or values in three "7-segment" displays
2. Buttons for scrolling through the menus or modifying values
3. "ESC": Button for exiting the menus (cannot be used for validation purposes)
4. "ENT": Validation button for entering a menu or confirming the new value selected

Description	Catalog number	Weight lb (kg)
Remote keypad display	**VW3G48101**	0.44 (0.20)
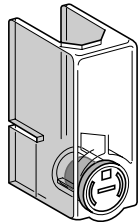
PROTECTIVE COVERS FOR POWER TERMINALS

LA9F702

To be used with tags closed

For starters	Number of covers per set	Catalog number	Weight lb (kg)
ATS48C14Y and ATS48C17Y	6 *(1)*	**LA9F702**	0.6 (0.25)
ATS48C21Y, ATS48C25Y and ATS48C32Y	6 *(1)*	**LA9F703**	0.6 (0.25)

(1)   The starters have 9 unprotected power terminals.

LINE REACTORS

The use of line reactors is recommended in particular when installing several electronic starters on the same line supply. The inductance values are defined for a voltage drop between 3% and 5% of the nominal line voltage.
Install the line reactor between the line contactor and the starter.

Reference	Value of the Inductance	Nominal current	Degree of protection	Reference	Weight
	mH	A			lb/kg
ATS48D17YU	2.5	18	Open type	**RL-01803**	16/7.3
ATS48D22YU	2.0	25	Open type	**RL-02503**	18/8.1
ATS48D32YU and D38YU	1.2	45	Open type	**RL-04503**	39/18
ATS48D47YU and D62YU	0.7	80	Open type	**RL-08003**	55/25
ATS48D75YU and D88YU	0.45	100	Open type	**RL-10003**	74/33
ATS48C11YU and C14YU	0.23	160	Open type	**RL-16003**	67/31
ATS48C17YU and C25YU	0.15	250	Open type	**RL-25003**	140/64
ATS48C32YU	0.125	320	Open type	**RL-32003**	190/86
ATS48C41YU and C48YU	0.085	500	Open type	**RL-50003**	290/132
ATS48C59YU	0.065	600	Open type	**RL-60003**	290/132
ATS48C66YU and M12YU	Consult Schneider Electric for information				

The POWERSUITE® advanced dialog solutions can be used for Schneider Electric drives and starters. They enable communication with the product from a Pocket PC/PDA, Personal Computer or a dedicated terminal. The solutions, with a Pocket PC or PC, enable files to be prepared for uploading to the drives and the starters. The POWERSUITE® software creates its files ensuring consistency between the configuration/adjustment functions of the product.

POWERSUITE® Pocket PC/PDA
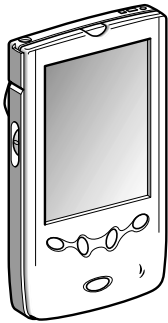
The Pocket PC/PDA can be used during preparation, programming, setup and maintenance. It comprises a Palm size PC terminal and corresponding connection accessories. The software is integrated into a Windows CE environment, for which the operating system language can be selected on ordering (English, French, German, Spanish, Italian). The software incorporates all the functions of integrated and remote terminals (drive or starter configuration and adjustment, control, signalling, etc).

The Pocket PC/PDA can be used:

• alone to prepare and store configuration/adjustment files (integral battery or line supply)

• connected to a PC for uploading configuration/adjustment files from the Pocket PC to the PC or downloading from the PC to the Pocket PC

• connected to the drive or to the starter for configuration, adjustment or control purposes or to upload a configuration/adjustment file from the Pocket PC to the product or download a configuration/adjustment file from the product to the Pocket PC.

POWERSUITE® software workshop for PC

The POWERSUITE® software workshop is used to set up a drive or a starter from a PC in a MICROSOFT® Windows 95, 98, NT4 or 2000 environment. The software incorporates all the functions of integrated and remote terminals (drive or starter configuration and adjustment, control, signalling, etc.) with assisted, guided operator dialog in 5 languages (English, French, German, Spanish, Italian) in a Windows environment. It can be used:

• alone to prepare and store drive or starter configuration files on diskette, CD-ROM or hard disk. The drive or starter configuration can be printed out on paper or can be exported to office automation software.

• connected to the drive or starter for configuration, adjustment or control purposes, or for uploading a configuration/adjustment file from the PC to the product or downloading from the product to the PC. Connection is via a link between the drive or starter connector and the serial port on the PC.

MAGELIS® display unit with matrix screen
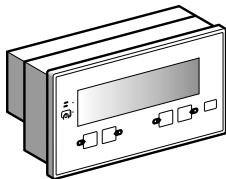
The MAGELIS® display unit with matrix screen can be used to monitor, diagnose and adjust up to 8 Altivar 28, 38, 58 or 58F drives in 5 languages (English, French, German, Spanish, Italian). It can display variables in alphanumeric format with European, Cyrillic or Asian fonts in 4 sizes, or it can display icons or background images in black and white as well as animations in barchart or gauge format. The application is preloaded in the factory.

Compatibility

Compatibility of advanced dialog solutions with drives and starters			Drives	Starter
			ATV28, ATV58, ATV58F	ATS48
POWERSUITE® Pocket PC	Pocket PC	VW3A8108●●	■	■
	Setup kit	VW3A8102	■	■
	Connection kit	VW3A8111	■	■
POWERSUITE® software workshop for PC	CD-ROM	VW3A8104	■ ≥ V 1.0	■ ≥ V 1.30
	Connection kit	VW3A8106	■	■
MAGELIS® display unit with matrix screen	Display unit	XBTHM017010A8	■	■ ≥ V 1.40
Accessories	Upgrade CD-ROM	VW3A8105	■ ≥ V 1.0	■ ≥ V 1.30
	Pocket PC Jornada Operator terminal	VW3A8103●●	■	■

▼ Incompatible products   ■ Compatible products and versions

ALTISTART® 48 Soft Start
POWERSUITE® Advanced Dialog Solutions

VW3A8103●●

POWERSUITE® Pocket PC/PDA

Several solutions are available to meet the needs of individual users:

- The complete Pocket PC/PDA
- The setup kit
- The connection kit

The complete Pocket PC is used to set up drives and starters. It comprises:

- 1 Palm size "Jornada 525" PC terminal, with multilingual operating system *(1)*, supplied with PC synchronization cable and mains power supply
- 1 CD-ROM containing the multilingual *(1)* setup software which can be ordered separately
- 1 connection kit for the Palm size PC terminal

The setup kit comprises:

- 1 CD-ROM containing the multilingual *(1)* setup software which can be ordered separately
- 1 connection kit for the Palm size PC terminal

The connection kit for the Palm size PC terminal comprises:

- 2 connection cables, length 0.6 m, with 2 RJ45 connectors, marked respectively "POWERSUITE®" and "ATV 28 before 09/01"
- 1 RJ45/9-way SUB-D adaptor for connecting ATV58 and ATV58F
- 1 converter marked "RS 232/RS-485 PPC" with one 9-way male SUB-D connector and 1 RJ45 connector.

Description	Catalog Number	Weight - lb (kg)
Complete Pocket PC	**VW3A8108●●** *(2)*	2.2 (1.00)
Setup kit	**VW3A8102**	0.9 (0.40)
Connection kit for the Palm size PC terminal	**VW3A8111**	0.7 (0.30)

POWERSUITE® software workshop for PC

The software workshop is used to set up the drives and starters from a PC. It comprises:

- 1 CD-ROM containing the multilingual *(1)* setup software
- 1 connection kit for PC

The PC connection kit comprises:

- 2 connection cables, length 3 m, with 2 RJ45 connectors, marked respectively "POWERSUITE®" and "ATV 28 before 09/01"
- 1 RJ45/9-way SUB-D adaptor for connection of ATV58 and ATV58F drives
- 1 converter marked "RS-232/RS-485 PC" with one 9-way male SUB-D connector and 1 RJ45 connector

Description	Catalog Number	Weight - lb (kg)
1 CD-ROM containing the multilingual setup software *(1)*	**VW3A8104**	2.2 (0.10)
Connection kit for PC	**VW3A8106**	0.8 (0.35)

XBTHM017010A8

MAGELIS® display unit with matrix screen

The terminal has a backlit LCD with 8 lines of 40 characters. The RS-458 connection kits for ATV28 (VW3A28301), ATV38 and ATV58 (VW3A58306) drives, as well as other connection accessories, should be ordered separately according to the number and type of drives connected. Please consult your Regional Sales Office.

Description	Catalog Number	Weight - lb (kg)
MAGELIS® display unit with matrix screen	**XBTHM017010A8**	1.3 (0.60)

Accessories

| Description	Catalog Number	Weight - lb (kg)
1 upgrade CD-ROM for multilingual *(1)* setup software *(3)*	**VW3A8105**	0.22 (0.10)
Palm size "Jornada 525" PC terminal supplied with PC synchronization cable and mains power supply	**VW3A8103●●** *(2)*	0.7 (0.30)
VW3A8103●● *(2)*	**VW3A8110**	0.22 (0.10)

(1) English, French, German, Spanish, Italian.
(2) To order the operating system in your chosen language, replace ●● by EN for English, FR for French, DE for German, SP for Spanish and IT for Italian.
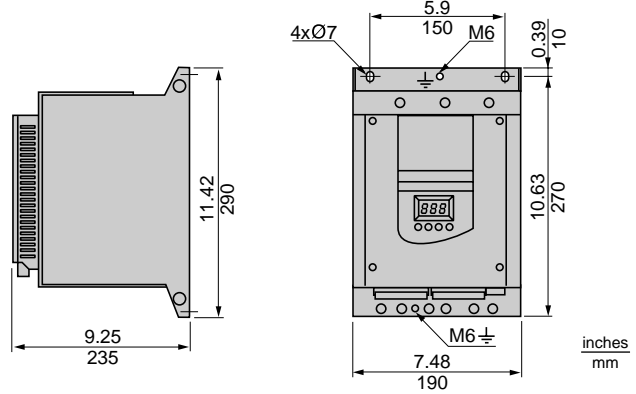*(3)* To find out about the latest available version, please consult your Regional Sales Office.
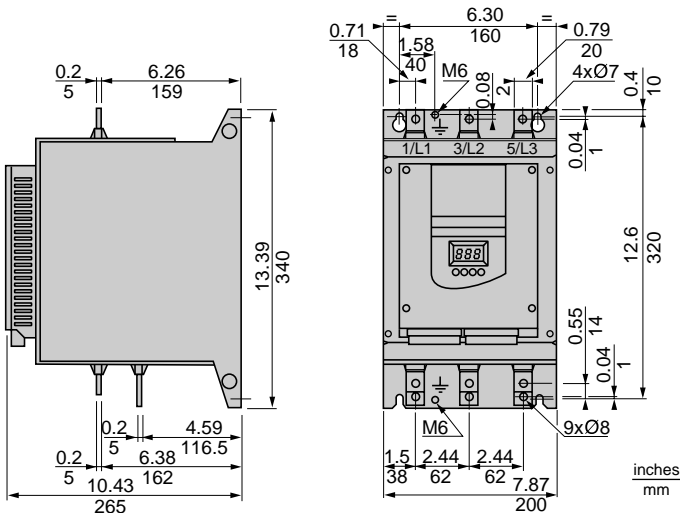
ATS48D17YU to ATS48D47YU
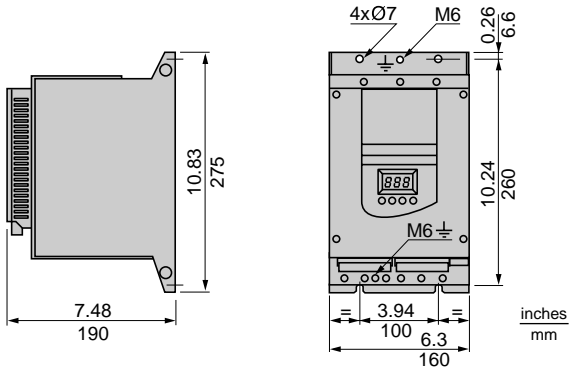
Maximum connection capacity:
Ground connections: 8 AWG (10 mm^2)
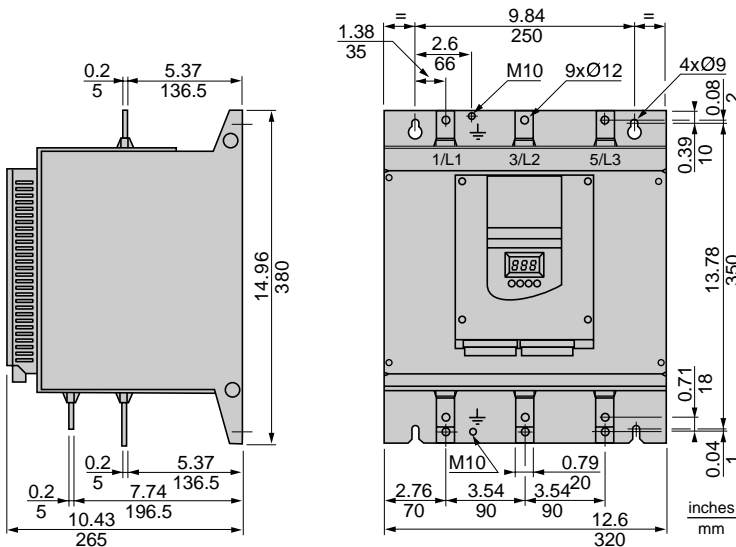Power terminals: 8 AWG (16 mm^2)

ATS48D62YU to ATS48C11YU

Maximum connection capacity:
Ground connections: 4 AWG (16 mm^2)
Power terminals: 2/0 (50 mm^2)

ATS48C14YU to ATS48C17YU

Maximum connection capacity:
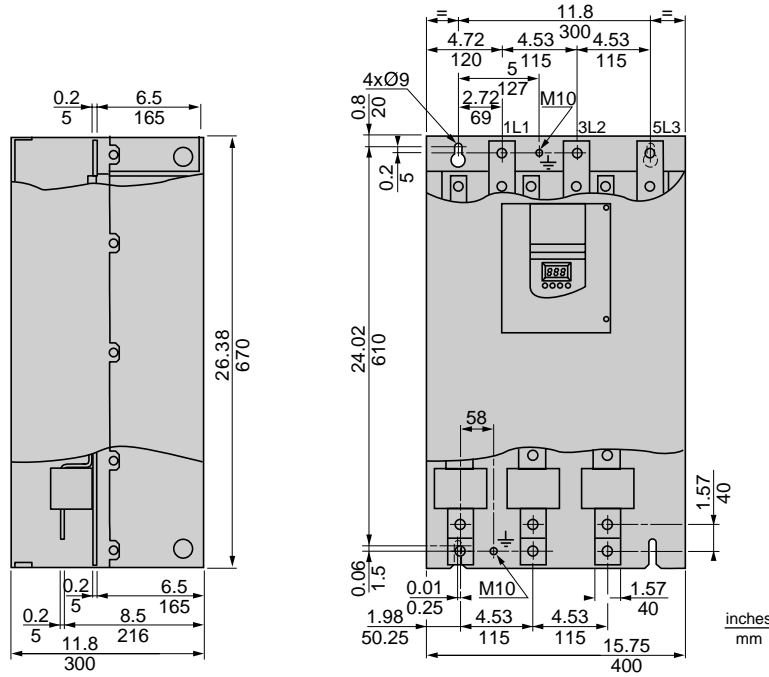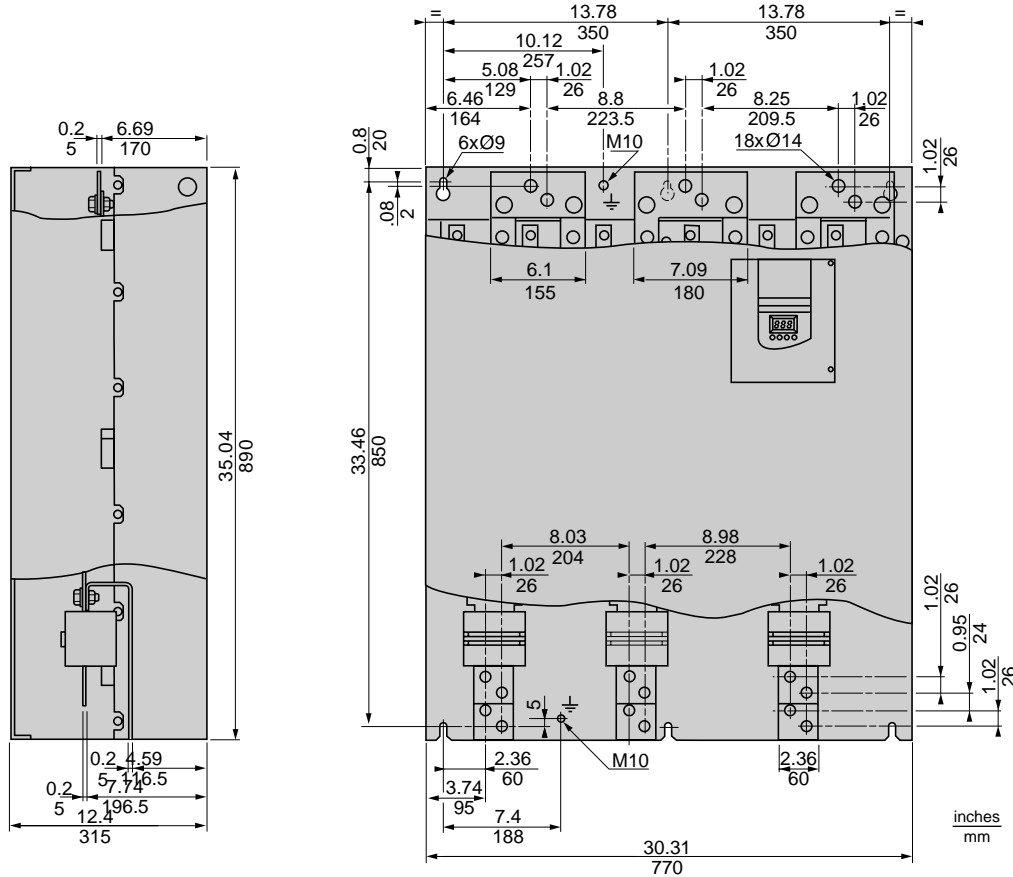Ground connections: Busbar (120 mm^2)
Power terminals: 2/0 (95 mm^2)

ATS48C21YU to ATS48C32YU

Maximum connection capacity:
Ground connections: Busbar (120 mm^2)
Power terminals: Busbar (240 mm^2)

Characteristics: pages 4 to 7	Dimensions: pages 17 to 18	Wiring Diagrams: pages 21 to 24

ALTISTART® 48 Soft Start
Dimensions

ATS48C41YU to C66YU

Maximum connection capacity:
Ground connections: Busbar (240 mm^2)
Power terminals: Busbar (2 x 240 mm^2)

ATS48C79YU to M12YU

Maximum connection capacity:
Ground connections: Busbar (2 x 240 mm^2)
Power terminals: Busbar (4 x 240 mm^2)

| Characteristics: pages 4 to 7 | Dimensions: pages 17 to 18 | Wiring Diagrams: pages 21 to 24 |

09/02

MOUNTING THE REMOTE KEYPAD DISPLAY

VW3G48101
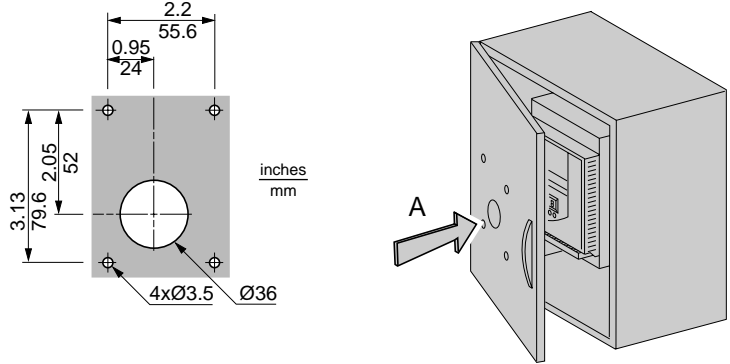
MOUNTING RECOMMENDATIONS

• Install the ATS48 Soft Start vertically, within ± 10˚.

• Do not place the ATS48 Soft Start adjacent to or above heating elements.

• Leave sufficient free space to ensure that the air required for cooling can circulate from the bottom to the top of the unit.

Note: The IP 00 version of the ATS48 Soft Start must be fitted with a protective bar to protect personnel against electrical contact. Protective covers are available for the ATS48C14YU to ATS48C32YU. They should be ordered separately.

Characteristics: pages 4 to 7   Dimensions: pages 17 to 18   Wiring Diagrams: pages 21 to 24
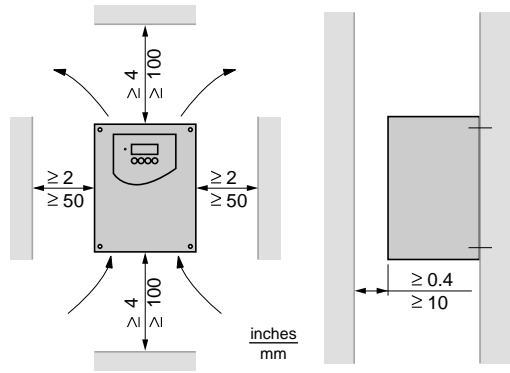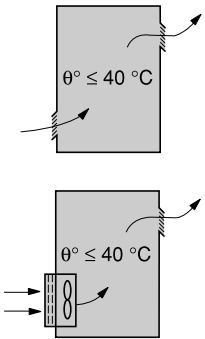
MOUNTING IN A METAL WALL-MOUNTED OR FLOOR-STANDING ENCLOSURE WITH DEGREE OF PROTECTION TYPE 1 (IP 23) OR TYPE 12 (IP 54)

- Observe the mounting recommendations on the previous page.
- To ensure proper air circulation in the starter:
  - Fit ventilation grilles
  - Ensure that there is sufficient ventilation. If there is not, install forced ventilation with a filter. The openings and/or fans must provide a flow rate at least equal to that of the starter fans (see the table below)
- Use special filters with Type 12 (IP 54) protection.

Fan flow rate depending on the starter rating

ATS48 starter	CFM	Flow rate m³/hour
ATS48D32YU and D38YU	24	14
ATS48D47YU	48	28
ATS48D62YU to C11YU	146	86
ATS48C14YU and C17YU	235	138
ATS48C21YU to C32YU	476	280
ATS48C41YU to C66YU	1020	600
ATS48C29YU to M12YU	2040	1200

Metal wall-mounted or floor-standing enclosure with Type 12 (IP 54) degree of protection

For non-ventilated ATS48 controllers (ATS48D17YU and 48D22YU), install a fan $\leq$ 2" (50 mm) below the starter to circulate the air inside the enclosure in order to avoid hot spots.

Calculating Enclosure Size

The maximum allowable thermal resistance of the enclosure equation, Rth (˚C/W), is calculated as follows:

$$Rth = \frac{\theta - \theta e}{P}$$

θ = maximum temperature inside enclosure in ˚C
θe = maximum external temperature in ˚C
P = total power dissipated in the enclosure in W

- The starter/motor combinations on pages 12 and 13 can be used in ambient temperatures $\leq$ 40 ˚C.
- For temperatures between 40 ˚C and 60 ˚C, derate the maximum permanent current of the starter by 2% for every degree above 40 ˚C.
- For the power dissipated by the starters at rated load: see pages 12 and 13.
- If the starts are infrequent, it is recommended to use a shorting/bypass contactor with the ATS48 controller at the end of start to minimize heat dissipation.

Calculate minimum useful heat exchange surface area requirement, S (in²):
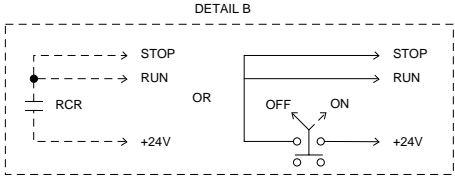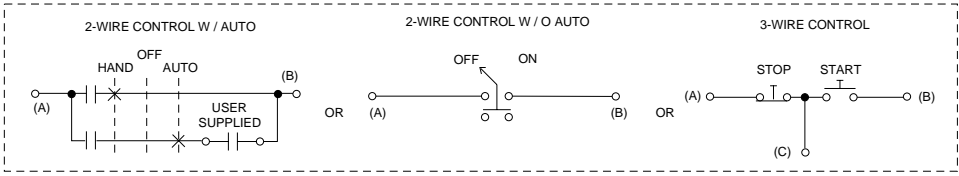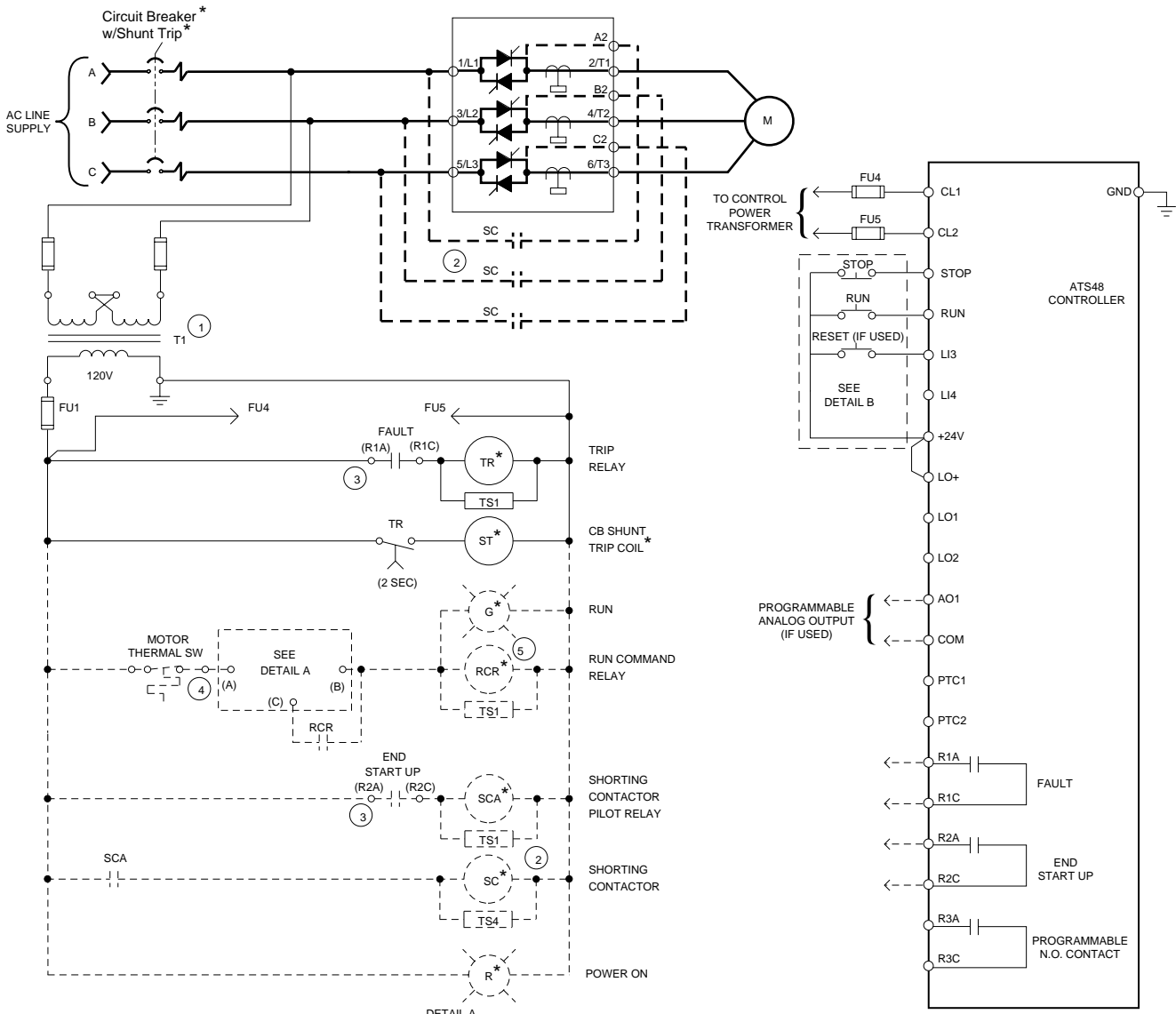
$$S = \frac{K}{Rth}$$

Rth = Thermal resistance of the enclosure (calculated previously)
K = Thermal resistance per square inch of the enclosure
   K = 186 with enclosure fan
   K = 233 without enclosure fan

Compare to the effective heat exchange surface area to the proposed wall mounted enclosure, S (in²) which should be less than:

S = (Front area) + (Top area) + 2 (Side area)

Characteristics: pages 4 to 7	Dimensions: pages 17 to 18	Wiring Diagrams: pages 21 to 24

Nonreversing with Shunt Trip Fault Isolation

Circuit Breaker *
w/Shunt Trip *

AC LINE SUPPLY

A
B
C

1/L1   2/T1
3/L2   4/T2
5/L3   6/T3

A2
B2
C2

SC
SC
SC

M

① ②

T1

120V

FU1 → FU4   FU5 ←

FAULT
(R1A)   (R1C)

③   TR *
TS1   TRIP RELAY

TR   ST *
CB SHUNT TRIP COIL *
(2 SEC)

G *   RUN

MOTOR THERMAL SW
SEE DETAIL A

④ (A)   (C)   (B)
RCR

RCR *   RUN COMMAND RELAY
⑤
TS1

END START UP
(R2A)   (R2C)
③   SCA *   SHORTING CONTACTOR PILOT RELAY
TS1

SCA
②
SC *   SHORTING CONTACTOR
TS4

R *   POWER ON

DETAIL A

TO CONTROL POWER TRANSFORMER

FU4   CL1
FU5   CL2

STOP   STOP
RUN   RUN
RESET (IF USED)   LI3
SEE DETAIL B   LI4
+24V
LO+
LO1
LO2

PROGRAMMABLE ANALOG OUTPUT (IF USED)
AO1
COM

PTC1
PTC2

R1A   FAULT
R1C

R2A   END START UP
R2C

R3A   PROGRAMMABLE N.O. CONTACT
R3C

GND

ATS48 CONTROLLER

2-WIRE CONTROL W / AUTO

HAND   OFF   AUTO   (B)
(A)
USER SUPPLIED
OR

2-WIRE CONTROL W / O AUTO

OFF   ON
(A)   (B)
OR

3-WIRE CONTROL

STOP   START
(A)   (B)
(C)

DETAIL B

STOP   STOP
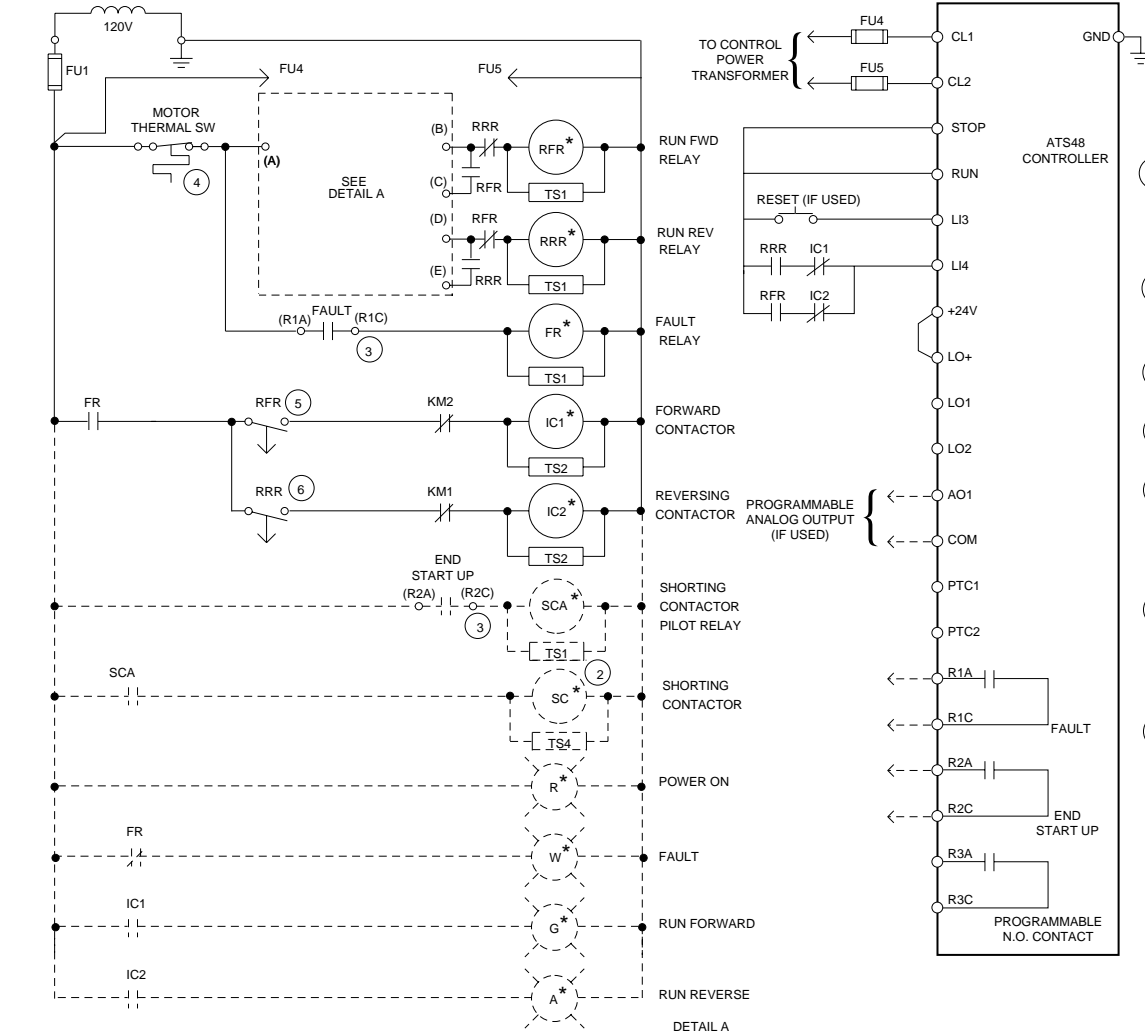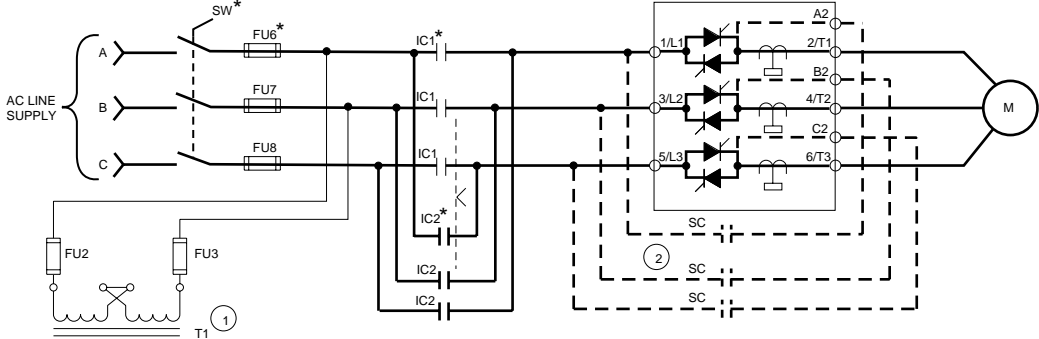RUN   RUN
RCR   OR   OFF   ON
+24V   +24V

① Control circuit connection for 460 V operation. Reconnect as required for other voltages.

② For shorting contactor operation, add SC with associated control circuit.

③ Relay contact located on ATS48 controller.

④ Located at motor. Jumper if switch not present.

⑤ Use RCR relay logic for ATS48 2-wire or 3-wire control when using shorting contactor.

* = User supplied

Characteristics: pages 4 to 7   Dimensions: pages 17 to 18   Wiring Diagrams: pages 21 to 24

Nonreversing with Isolation Contactor

DETAIL A

2-WIRE CONTROL W / AUTO

OFF

HAND   OFF   AUTO

(B)

(A)   USER SUPPLIED

OR

2-WIRE CONTROL W / O AUTO

OFF   ON

(A)   (B)

OR

3-WIRE CONTROL

STOP   START

(A)   (B)

(C)

① Control circuit connected for 460 V operation. Reconnect as required for other voltages.

② For shorting contactor operation add SC with associated control wiring.

③ Relay contact located on ATS48 controller.

④ Located at motor. Jumper if switch not present.

⑤ Set RCR time slightly longer than expected deceleration time from rated speed to zero speed. The time delay RCR contact may be omitted if the configuration of the R1 relay is changed to isolating relay mode.

* = User supplied

| Characteristics: pages 4 to 7 | Dimensions: pages 17 to 18 | Wiring Diagrams: pages 21 to 24 |

09/02

Reversing with Isolation Contactors

DETAIL A

Notes:

1. Control circuit connected for 460 V operation. Reconnect as required for other voltages.

2. For shorting contactor operation, add SC with associated circuitry.

3. Relay contact located on ATS48 controller.

4. Located at motor. Jumper if switch not present.

5. Set RFR time slightly longer than the expected deceleration time from rated forward speed to zero speed.

6. Set RRR time slightly longer than the expected deceleration time from rated reverse speed to zero speed.

7. Remove these contacts to inhibit direction reversal without first depressing STOP push button.

* = User supplied

ALTISTART® 48 Soft Start
Recommended Wiring Diagrams

Description of Logic for Recommended Wiring Diagrams

Item	Name	Description
IC1 IC1A	Isolation Contactor (Fwd)	The isolation contactor logic closes IC1 upon a start command and opens IC1 after the stop is complete. The RCR (or RFR and RRR for reversing) are timed contacts that must have a time delay greater than the deceleration ramp time or the dynamic braking time. When a coast stop is selected, the time delay must be set for a time that will allow a complete decay of the motor residual voltage. The isolation contactor will open immediately upon a fault. The pilot relay (IC1A) is required when the IC1 contactor coil exceeds the relay rating.
IC2 IC2A	Isolation Contactor (Rev)	Used for reversing applications only, the IC2 must be mechanically interlocked to IC1. A reversing contactor may be used for the combination of IC1 and IC2. In general, the operation of IC2 is identical to IC1. The pilot relay (IC1A) is required when the IC1 contactor coil exceeds the relay rating.
SC SCA	Shorting Contactor & Pilot Relay	The shorting contactor is used to reduce the heat dissipated by the controller when the motor is operating at full speed and voltage. The starter provides proper sequencing of this contactor by the "end-start-up" relay. When the start is completed, the shorting contactor will be commanded to close. The starter will continue to monitor the motor thermal state and provide motor overload protection. Upon a stop command, the SC contactor will open, transferring the motor current to the Scars to allow for controlled deceleration if desired. The pilot relay (SCA) is required when the SC contactor coil exceeds the relay rating.
TS	Transient Suppressors	Transient suppression of all relay and contactor coils (except ST) is recommended to minimize the possibility of electrical interference with the starter electronics and to increase relay contact life.
RCR	Run Command Relay	Used in all non-reversing logic (optional in shunt trip) for proper sequencing of contactor logic. When energized, RCR initiates the start sequence. When de-energized, stopping is initiated. Operator controls can be either on/off selector switch, HOA selector switch or start/stop push buttons. RCR remains energized during a fault. Once the fault condition has been cleared, RCR must be de-energized by a "stop" command then re-energized to restart the controller.
RFR	Run Forward Relay	Used for reversing applications only, this coil duplicates the functionality of RCR for the forward direction and is interlocked with the RFR relay.
RRR	Run Reverse Relay	Used for reversing applications only, this coil duplicates the functionality of RCR for the reverse direction and is interlocked with the RRR relay.
ST	Shunt Trip Coil	This coil is attached to the shunt trip coil on the disconnect and will energize 2 seconds after a starter fault by the TR timer contact. The time delay is to prevent nuisance tripping of the circuit breaker during controller power-up or during line undervoltage conditions.
TR	Trip Relay	Used in shunt trip circuit breaker logic only; coil energized upon a starter fault.
FR	Fault Relay	Used with logic diagrams that use an isolation contactor. The fault relay is energized during normal operation and deenergizes if the starter fault contacts open or if the motor thermal switch (if supplied) opens. FR also provides additional contacts for the starter fault output.

Suggested Components for Standard Duty Applications

Induction Motor				ALTISTART® Controller				
M				ATS		FU4/FU5		
Rated hp ▲				ATS48 Soft Starter	Device Rated Current	ATS Control	Class CC Control Fuse Size	
208 V	230 V	460 V	575 V	Model	@ 40 ˚C ■	Power Burden (VA)	@ 208/230 V	@ 460/575 V
3	5	10	15	ATS48D17YU	17	25	0.25 A	0.25 A
5	7.5	15	20	ATS48D22YU	22	25	0.25 A	0.25 A
7.5	10	20	25	ATS48D32YU	32	25	0.25 A	0.25 A
10	—	25	30	ATS48D38YU	38	25	0.25 A	0.25 A
—	15	30	40	ATS48D47YU	47	25	0.25 A	0.25 A
15	20	40	50	ATS48D62YU	62	25	0.25 A	0.25 A
20	25	50	60	ATS48D75YU	75	25	0.25 A	0.25 A
25	30	60	75	ATS48D88YU	88	25	0.25 A	0.25 A
30	40	75	100	ATS48C11YU	110	25	0.25 A	0.25 A
40	50	100	125	ATS48C14YU	145	25	0.25 A	0.25 A
50	60	125	150	ATS48C17YU	170	25	0.25 A	0.25 A
60	75	150	200	ATS48C21YU	210	25	0.25 A	0.25 A
75	100	200	250	ATS48C25YU	250	25	0.25 A	0.25 A
100	125	250	300	ATS48C32YU	320	25	0.25 A	0.25 A
125	150	300	350	ATS48C41YU	410	25	0.25 A	0.25 A
150	—	350	400	ATS48C48YU	480	25	0.25 A	0.25 A
—	200	400	500	ATS48C59YU	590	25	0.25 A	0.25 A
200	250	500	600	ATS48C66YU	660	25	0.25 A	0.25 A
250	300	600	800	ATS48C79YU	790	25	0.25 A	0.25 A
350	350	800	1000	ATS48M10YU	1000	25	0.25 A	0.25 A
400	450	1000	1200	ATS48M12YU	1200	25	0.25 A	0.25 A

▲ Motor full load currents through 500 hp @ 460/575 V, 250 hp @ 230 V, and 200 hp @ 208 V are taken from the Canadian Electrical Code. Above these ratings, motor full load currents are calculated based upon 1.2 A/hp for 460 V and 2.4 A/hp for 230 V. Motors listed are for standard duty applications. For severe duty applications, select the next larger controller size.

■ The ambient temperature indicated in the table represents the temperature of the air surrounding the ATS48 controller. Any additional temperature factors associated with the enclosure system or actual installation ambient temperature must be considered when determining the actual rated current (I_{CL}) of the starter. For operating ambient above 40 ˚C without a shorting/bypass contactor and 50 ˚C with a shorting/bypass contactor but not exceeding 60 ˚C, the rated current (I_{CL}) of the starter must be de-rated by 2% per ˚C.

NOTE: To select control operators (push buttons, pilot lamps, and selector switches), control power transformers, and wire management devices (control and power terminal strips, wire terminations) indicated on the recommended wiring diagram configurations, visit www.schneider-electric.ca.

Additional Suggested Components for Standard Duty Applications

ATS	Contactors [a, b, c]				Disconnect [d]				Circuit Breaker
	IC1	IC2		SC	Fusible Disconnect				
ATS48 Model	Isolation Contactor	Reversing Contactor [e]	Mechanical Interlock	Shorting Contactor (AC1)	Power Fuses Class/Rating	Ferraz Shawmut fuses or equivalent	Fuse Block [f]	Molded Case Switch [g]	Thermal Magnetic [g]
D17Y	LC1D18	LC1D18	h	LC1D18	J / 25	AJT25	60308J	FHL36000M	FAL36030
D22Y	LC1D25	LC1D25	h	LC1D25	J / 30	AJT30	60308J	FHL36000M	FAL36040
D32Y	LC1D32	LC1D32	h	LC1D32	J / 40	AJT40	60608J	FHL36000M	FAL36050
D38Y	LC1D40	LC1D40	h	LC1D40	J / 50	AJT50	60608J	FHL36000M	FAL36060
D47Y	LC1D50	LC1D50	h	LC1D50	J / 60	AJT60	60608J	FHL36000M	FAL36080
D62Y	LC1D65	LC1D65	h	LC1D65	J / 80	AJT80	61038J	FHL36000M	FAL36090
D75Y	LC1D80	LC1D80	h	LC1D80	J / 100	AJT100	61038J	FHL36000M	FAL36100
D88Y	LC1D80	LC1D80	h	LC1D80	J / 120	AJT125	62003J	KHL36000M	KAL36110
C11Y	LC1D115	LC1D115	h	LC1D115	J / 150	AJT150	62003J	KHL36000M	KAL36150
C14Y	LC1D150	LC1D150	h	LC1D150	J / 200	AJT200	62003J	KHL36000M	KAL36200
C17Y	LC1F185	LC1F185	LA9FF970	LC1F185	J / 225	AJT225	64033J	LHL36000M	LAL36225
C21Y	LC1F265	LC1F265	LA9FG970	LC1F265	J / 300	AJT300	64033J	LHL36000M	LAL36250
C25Y	LC1F265	LC1F265	LA9FJ970	LC1F265	J / 350	AJT350	64033J	LHL36000M	LAL36350
C32Y	LC1F400	LC1F400	LA9FJ970	LC1F400	J / 400	AJT400	64033J	LHL36000M	LAL36400
C41Y	LC1F400	LC1F400	LA9FJ970	LC1F400	J / 500	AJT500	6633J	MHL36000M	MAL36500
C48Y	LC1F500	LC1F500	LA9FJ970	LC1F500	J / 600	AJT600	6633J	MHL360006M	MAL36600
C59Y	LC1F630	LC1F630	LA9FJ970	LC1F630	L / 700	A4BQ700	f	MHL360008M	MAL36800
C66Y	LC1F800	LC1F800	LA9FJ970	LC1F800	L / 900	A4BQ900	f	MHL360008M	MAL36900
C79Y	LC1BL33	LC1BL33	LA9FL970	LC1BL33	L / 1100	A4BQ1200	f	MHL36000M	i
M10Y	LC1BL33	LC1BL33	LA9FL970	LC1BL33	L / 1350	A4BQ1350	f	MHL36000M	i
M12Y	LC1BP33	LC1BP33	LA9FX970	LC1BP33	L / 1600	A4BQ1600	f	NCL3600012M	i

a. All coils are selected for 120 V, 60 Hz operation. Refer to the Industrial Control Products Catalogue for additional coil voltages or auxiliary contact configurations. One block may be added to each contactor.

b. Power terminals are not included with LC1-F contactors. For additional ordering information visit www.schneider-electric.ca.

c. The use of transient suppressors across all contactor coils is recommended. Refer to the latest editions of Schneider Electric's full line product catalogs for selection of transient suppressors.

d. According to the Canadian Electrical Code, branch circuit overcurrent protection must be provided for each controller. Short circuit protective devices recommended in this table are within CEC requirements for Type 1 coordination.

e. Reversing contactors for C11 through M12 controllers must be assembled from components. Parts quantities for a basic contactor assembly, minus the power connection links and terminals, are indicated before each part number. Refer to the latest editions of Schneider Electric's full line product catalogs for power connector link and terminal kits. Reversing contactor interlock units used for the C79 through M12 controllers are designed for vertical interlocking of the individual contactors. Horizontally interlocked contactors are used for D17 through C59 controllers.

f. Fuse holder part number references are for Class J fuses only based on Ferraz Shawmut spring reinforced with box type connectors acceptable for Al/Cu wiring. Class L fuses require bolt-on connections to user-supplied power bus work.

g. The molded case switches and circuit breakers selected require the addition of operator mechanisms to allow operation from the exterior of an enclosure. Refer to the latest editions of Schneider Electric's full line product catalogs for operator mechanism information. When using a shunt trip relay for SCR fault isolation, order a disconnect switch with suffix -1021 for addition of shunt trip coil.

h. The D Line contactor is available as a reversing configuration. For these applications, change the IC1 part number prefix from LC1- to LC2- to order the IC1 and IC2 combination complete with mechanical interlocks.

i. Devices rated above 660 A have not been coordinated with circuit breakers. You must use a Class L fuse for overcurrent protection with ATS48 soft starter models C79, M10, and M12.

Summary of functions

Description		See pages
Starter factory setting		p. 27
Adjustment functions	Nominal motor current (maximum permanent current)	p. 27
	Limiting current	p. 27
	Acceleration ramp time	p. 27
	Initial starting torque	p. 27
	Selection of the type of stop	p. 28
Protection functions	Calculated motor thermal protection	p. 28
	Reset motor thermal state	p. 28
	Motor thermal protection with PTC probes	p. 28
	Starter thermal protection	p. 28
	Motor underload protection	p. 29
	Excessive acceleration time protection	p. 29
	Current overload protection	p. 29
	Protection against line phase inversion	p. 29
	Time before restarting	p. 29
	Motor phase loss detection	p. 29
	Automatic restart	p. 29
Advanced adjustment functions	Torque limit	p. 30
	Voltage boost level	p. 30
	Test on low power motor	p. 30
	Activation of the cascade function	p. 30
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	Return to factory settings	p. 30
2nd motor adjustment functions		p. 30
Communication functions		p. 31
POWERSUITE® advanced dialog solutions		p. 31
Application monitoring functions		p. 31
Logic input application functions	2-wire/3-wire control	p. 32
	Freewheel stop	p. 32
	External fault	p. 32
	Force to local control mode	p. 32
	Reset motor thermal fault	p. 32
	Activation of the cascade function	p. 32
	Reset all faults	p. 32
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Relay and analog output application functions		p. 33
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Starter factory setting

Adjustments	? (ok) X
Current	Transfer

IN Motor nominal current

    15,2   A

ILT Coefficient of current limit

    400   %
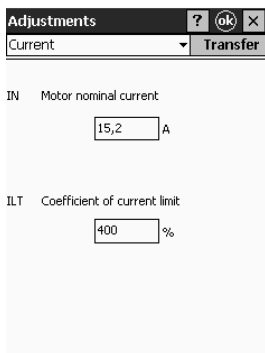
Current setting with
POWERSUITE® on PPC

The starter is supplied ready for use in most applications. The main functions enabled and the default function values are as follows:

- Nominal motor current
  (depends on the starter rating)
- Limiting current: 400%
- Acceleration ramp time: 15 s
- Initial starting torque: 20%
- Selection of the type of stop: freewheel stop
- Motor thermal protection: class 10
- Time before restarting: 2 s
- Motor phase loss threshold: 10%
- Line frequency: automatic

- RUN and STOP logic inputs:
  2-wire or 3-wire control via wiring
- Logic input LI3: forced freewheel stop
- Logic input LI4: local mode control
  (serial link disabled)
- Logic output LO1: thermal motor alarm
- Logic output LO2: motor powered
- Relay output R1: fault relay
- Relay output R3: motor powered
- Analog output: motor current
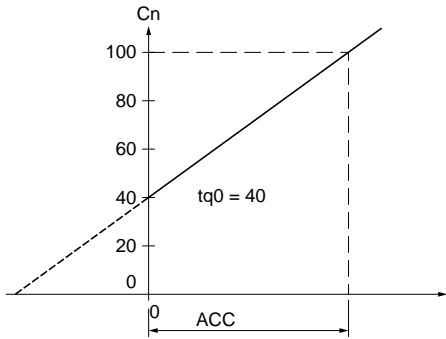
Acceleration ramp during time ACC with initial starting torque Iq0 = 40% of the nominal motor torque
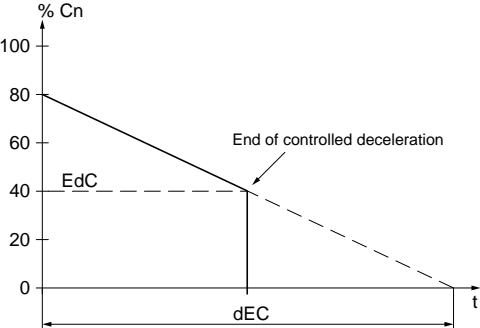
Decelerated stop by torque control during time dEC with threshold Edc for changing to freewheel stop mode

Edc = 40% of nominal motor torque
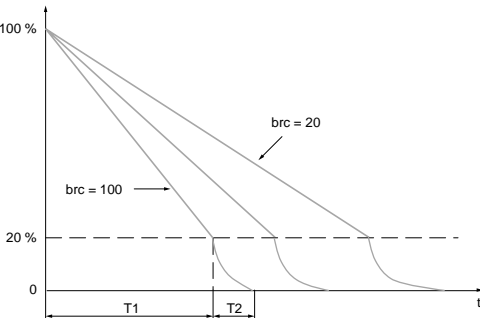
INTELE™ braking stops for different braking torque levels brc

Adjustment functions

- **Nominal motor current** (maximum continuous current)
  The nominal current of the starter can be adapted to the nominal motor current indicated on the rating plate.
  Adjustment range: 0.4 to 1.3 times the starter nominal current.

- **Limiting current**
  The maximum starting current can be adjusted.
  Adjustment range: 150% to 700% of the nominal motor current set and limited to 500% of the maximum permanent current defined for the starter rating.

- **Acceleration ramp time**
  During the starting phase, the ATS48 controller applies a torque ramp to the motor. The time (ACC) set corresponds to the time taken by the ramp to reach the nominal torque (starting at 0). Adjustment range: 1 to 60 s.

- **Initial starting torque**
  The initial torque tq0 applied to the motor can be used to instantly overcome any resistive starting torque. Adjustment range: 0 to 100% of the nominal motor torque.

- **Selection of the type of stop**
  Three types of stop are available for selection:

  — **Freewheel motor stop**

  — **Motor stop by deceleration via torque control (pump application)**
    This type of stop enables a centrifugal pump to be decelerated gradually on a ramp in order to avoid a sudden stop. It can be used to dampen the hydraulic transient in order to significantly reduce pressure surges. The deceleration ramp time (dEC) can be adjusted. During deceleration, the pump flow rate decreases and becomes negligible at a certain speed. To continue to decelerate would serve no purpose. A torque threshold (EdC) can be set at which the motor will change to freewheel stop mode, avoiding the unnecessary heating of the motor and the pump.

  — **INTELE™ braking**
    The braking torque level (brc) can be adjusted. The dynamic braking time (T1) corresponds to the time taken to decelerate from 100% to 20% of the nominal motor speed. To improve braking at the end of deceleration, the starter injects a DC current for an adjustable period of time (T2). It produces less motor heating than traditional DC injection braking.

    Consult the Square D/Schneider Electric Product Support Group (1-800-565-6699) for criteria to be met for this feature.
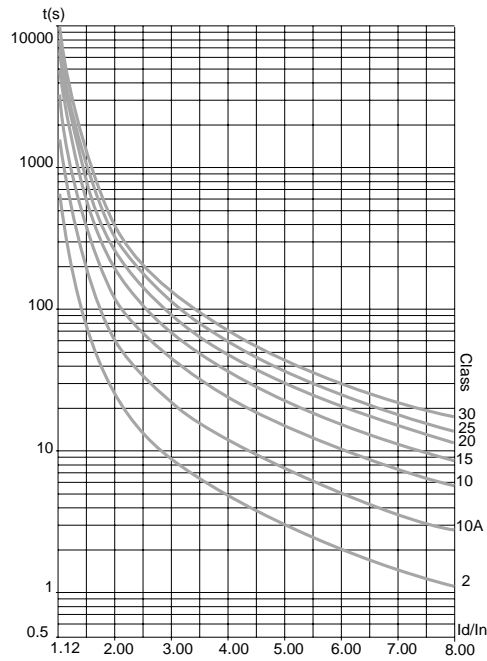
Motor thermal protection curves (cold)
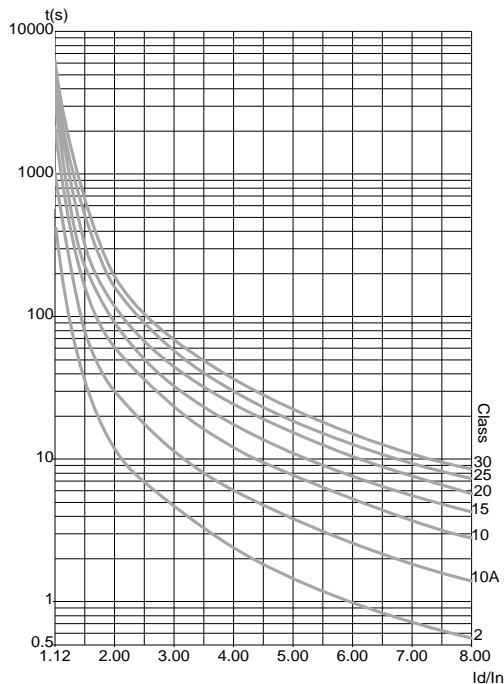
Motor thermal protection curves (warm)

Protection Functions

The ATS48 Soft Start offers functions for protecting the motor and the machine.

- **Calculated motor thermal protection**
  The starter continuously calculates the temperature rise of the motor based on the nominal current which has been set and the actual current absorbed. In order to adapt the ALTISTART to individual motors and applications, several protection classes are offered in accordance with standard IEC 60947-4-2: Class 30, Class 25, Class 20 (severe duty application), Class 15, Class 10 (standard duty application), Class 10 A, sub-class 2.
  Different protection classes are defined for the starting capacities of the motor:
  - cold start without thermal fault (corresponding to a stabilized motor thermal state, motor switched off)
  - warm start without thermal fault (corresponding to a stabilized motor thermal state, at nominal power)
  The motor thermal protection function can be disabled.
  After the motor has stopped or the starter has been switched off, the thermal state is calculated even if the control circuit is not energized.
  The ATS48 controller's thermal control prevents the motor from restarting if the temperature rise is too high. If special motors are used which do not have thermal protection via curves, provide external thermal protection via probes or thermal overload relays.
  The starter is factory preset to Class 10.
  The tripping curves are based on the relationship between the starting current Is and the (adjustable) nominal motor current In.

Trip time (cold)

Trip time for a standard duty application (class 10)			Trip time for a severe duty application (class 20)		
Is = 3 In	Is = 4 In	Is = 5 In	Is = 3.5 In	Is = 4 In	Is = 5 In
46 s	23 s	15 s	63 s	48 s	29 s

Trip time (warm)

Trip time for a standard duty application (class 10)			Trip time for a severe duty application (class 20)		
Is = 3 In	Is = 4 In	Is = 5 In	Is = 3.5 In	Is = 4 In	Is = 5 In
23 s	12 s	7.5 s	32 s	25 s	15 s

- **Reset motor thermal state**
  Activating the function resets the motor thermal state calculated by the starter to zero.
- **Motor thermal protection with PTC [1] probes**
  The starter integrates the processing of PTC probes, thus avoiding the use of an external device. The "PTC probe thermal overshoot" fault or alarm can be indicated using a configurable logic output or displayed via the serial link. The function can be disabled.
  Note: The "PTC probe protection" and "calculated motor thermal protection" functions are independent and can be active simultaneously.
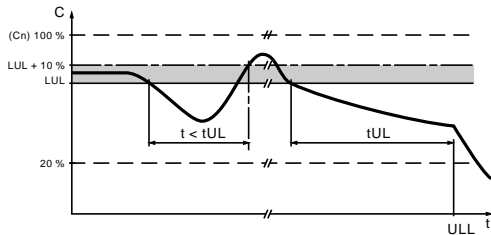- **Starter ventilation**
  The cooling fan on the starter is switched on as soon as the heatsink temperature reaches 50 ˚C. It is switched off when the temperature returns to 40 ˚C.
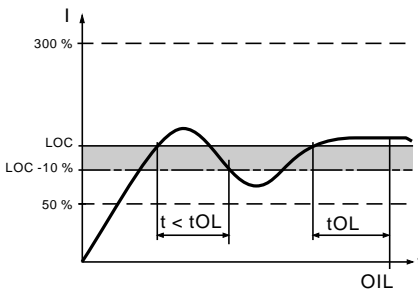
Starter thermal protection
The starter is protected against thermal overloads by an analog thermal probe.

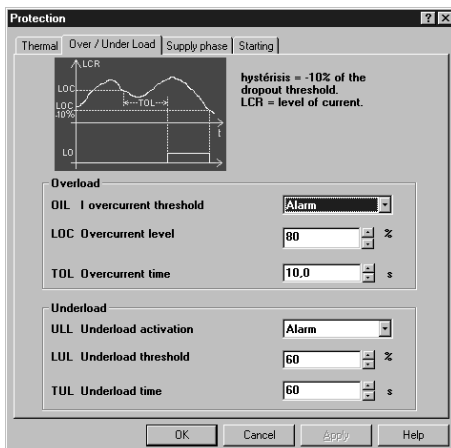[1] PTC: Positive Temperature Coefficient

Protection functions (continued)

Motor underload detection (ULL)

Motor overcurrent detection (OIL)

Configuring the starter overload and underload with POWERSUITE® on a PC

- **Motor underload protection**
  The starter detects a motor underload if the motor torque falls below a preset torque threshold (LUL) for a specific (adjustable) period of time (tUL).
  The motor underload threshold can be set between 20% and 100% of the nominal motor torque. The permissible underload duration can be set between 1 and 60 s. The detection function can trigger an alarm or a fault. The detection function can be disabled. The "motor underload detected" alarm can be indicated by a configurable logic output and/or displayed via the serial link in the state of the starter. The "motor underload detected" fault (ULF) locks the starter and can be displayed via the serial link.

- **Excessive acceleration time protection**
  This protection function can be used to detect a start which takes place in adverse conditions. Examples of such conditions include a locked rotor or a motor unable to reach its nominal rotation speed. If the start duration is greater than the value set (between 10 and 999 s), the drive changes to fault mode. The function can be disabled.

- **Current overload protection**
  The starter detects a current overload if the motor current exceeds a preset overcurrent threshold (LOC) for a specific (adjustable) period of time (tOL). The overcurrent threshold can be set between 50% and 300% of the nominal motor current. The permissible overcurrent duration can be set between 0.1 and 60 s. This function is only active in steady state. The detection function can trigger an alarm or a fault. It can also be disabled. The "current overload detected" alarm can be indicated by a configurable logic output and/or displayed via the serial link. The "current overload detected" fault (OLC) locks the starter and can be displayed via the serial link in the state of the starter.

- **Protection against line phase inversion**
  This function can be used to detect the direction of rotation of the motor phases and, if it is enabled, to indicate a fault when the direction of rotation is reversed.

- **Time before restarting**
  This function can be used to avoid several consecutive starts which may cause:
  - the thermal overheating of the application, which is not permitted
  - a thermal fault which will require maintenance work to be carried out
  - overcurrents (if the direction of rotation is reversed) or repeats (run/stop commands)
  Following a stop command, the motor can only restart once the preset time delay has elapsed. The motor is restarted once the time delay has elapsed if a run command is still valid or if a new run command is sent.
  Adjustment range: 0 to 999 s.

- **Motor phase loss detection**
  The function is used to adjust the sensitivity of the protection function in order to detect a loss of current or a low current in one of the three motor phases for at least 0.5 s or in all three motor phases for at least 0.2 s. The value of the minimum current level can be set between 5% and 10% of the starter nominal current.

- **Automatic restart**
  After locking on a fault, the function permits up to six restart attempts at intervals of 60 s if the fault has disappeared and the run commands are still present. After the sixth attempt, the starter will remain locked and the fault will have to be reset before a restart is permitted.
  If the function is active, the fault relay remains activated if line phase loss, motor phase loss or line frequency out of tolerance faults are detected. This function can only be used in 2-wire control.

Advanced adjustment functions

C

100 % Un

Cd

Torque ramp

50 % Un

100 ms

t
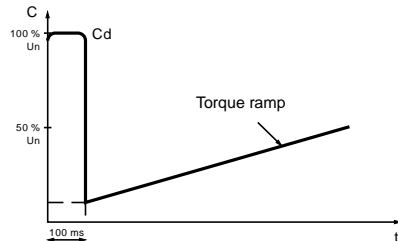
Application of a voltage boost equal to 100% of the nominal motor voltage

• **Torque limit**
Designed primarily for high inertia and constant torque conveyor applications, the function restricts the torque ramp reference to the preset value.
For example, the function can be used to limit the torque to a constant value throughout the starting period.
Adjustment range: 10% to 200% of the nominal motor torque.

• **Voltage boost level**
The function can be used to avoid any "starting" torque (phenomenon caused by friction on stopping or by mechanical play). When a run command is sent, the starter applies a fixed voltage to the motor for a limited period of time before starting. The function can be disabled. The voltage setting value varies between 50% and 100% of the nominal motor voltage.

• **Test on low power motor**
This function can be used to test a starter on a motor whose power is very much lower that of the starter. It can be used for example to check the electrical wiring of a device. The function is automatically cancelled when the starter is switched off. The next time the starter is switched on, the starter returns to its initial configuration.

• **Activation of the cascade function**
This function can be used to start and decelerate several cascaded motors with a single starter. In order to gain maximum benefit from torque control, it is advisable to use motors with powers between 0.5 and 1 times the power of the motor.

• **Line frequency**
The following frequencies can be selected for the function:
- 50 Hz. The frequency fault monitoring tolerance is ± 20%.
- 60 Hz. The frequency fault monitoring tolerance is ± 20%.
- Automatic detection of the line frequency by the starter The frequency fault monitoring tolerance is ± 6%.

— 50 Hz and 60 Hz are recommended if the power supply is provided by a emergency standby generator set, given their high tolerance.

• **Reset kWh or the operating time**
Sets the value of the power in kW/h or the operating time value to 0. The calculation of the values is updated once the reset command has been sent.

• **Return to factory settings**
The function can be used to reset each setting to its initial value (starter factory setting, see page 26).

2nd motor adjustment functions

In order to access the 2nd motor adjustment functions, one logic input must be assigned to the second set of motor parameters function. The adjustment functions and ranges are identical for both sets of motor parameters.
The settings are as follows (see page 27):

— Nominal motor current

— Limiting current

— Acceleration ramp time

— Initial starting torque

— Deceleration ramp time

— Threshold for changing to freewheel stop mode at the end of deceleration

— Maximum torque limit

Communication functions

The ATS48 Soft Start is supplied with an RS-485 multidrop serial link with MODBUS® Systems protocol as standard. The serial link is configured in the Communication menu using:

- The address of the starter, which can be set between 0 and 31
- The communication speed, which can be set at: 4800, 9600 or 19200 bps
- The format of the communication data. The following formats can be selected:
  - 8 data bits, odd parity, 1 stop bit
  - 8 data bits, even parity, 1 stop bit
  - 8 data bits, no parity, 1 stop bit
  - 8 data bits, no parity, 2 stop bits
- The time-out, which can be set between 1 and 60 s

POWERSUITE® advanced dialog solutions

The POWERSUITE® advanced dialog solutions (see pages 15 and 16) offer the following advantages:

- Connection to the ATS48 Soft Start and access to the adjustment, monitoring and control functions
- Display of messages in plain text in 5 languages (English, French, German, Spanish and Italian)
- Preparation and saving of settings to hard disk
- Comparison and editing of settings using office automation tools
- Downloading of starter settings to the PC and uploading from the PC to the starter
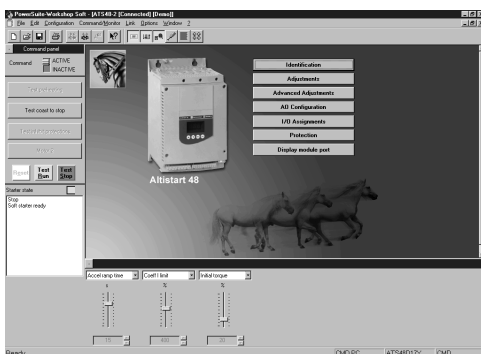
Displaying the commands and settings with POWERSUITE® on PC

Application monitoring functions

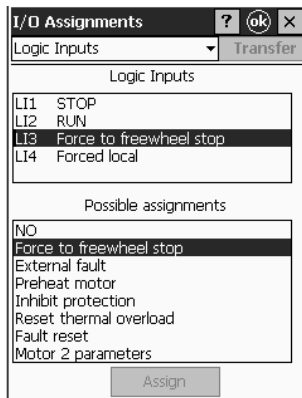The monitoring functions provide the following information:

- Power factor, displayed between 0.00 and 1.00
- Motor thermal state: 100% corresponds to the thermal state of the motor consuming the permanently set nominal current
- Motor current: displayed in amperes between 0 and 999 A and in kA between 1000 and 9999 A
- The operating time corresponding to the total number of starter operating hours during heating, acceleration, steady state, deceleration, braking and continuous bypass operation. It is displayed in hours between 0 and 999 hours and in kilo hours between 1000 and 65536 hours. The active power is displayed between 0 and 255%, where 100% corresponds to the power at the set nominal current and at full voltage.
- The motor torque is displayed between 0 and 255%, where 100% corresponds to the nominal torque.
- The active power consumed is displayed in kW. The line voltage value must be configured. The accuracy of this setting will depend on the error between the voltage configured and the actual voltage.
- Energy in kWh displayed with POWERSUITE®
- The following starter states are shown in the display of the current state:

  — Starter without run command and power not supplied
  — Starter without run command and power supplied
  — Acceleration/deceleration in progress
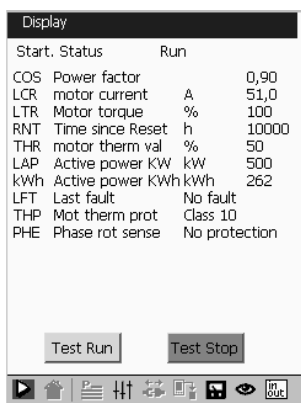
Monitoring the parameters with POWERSUITE® on PPC

— Steady state operation

— Braking in progress

— Starter in current limiting mode

— Starting time delay not elapsed

• Last fault. Displays the last fault which occurred.

• Phase rotation direction. Displays the direction of rotation (direct or indirect).

• **Keypad display locking code**

— An access code can be used to protect access to the adjustment and configuration parameters of the starter. Only the monitoring parameters will then be visible.

Logic input application functions

The starter has 4 logic inputs:

• **2 logic inputs (RUN and STOP) are reserved for run/stop commands** which can be sent in the form of stay-put contacts or as pulsed contacts.

— **2-wire control**: Starting and stopping are controlled by a single logic input. State 1 of the logic input controls starting and state 0 controls stopping.

— **3-wire control**: Starting and stopping are controlled by 2 separate logic inputs. A stop is obtained on opening (state 0) the STOP input. The pulse on the RUN input is stored until the stop input opens.

• **2 logic inputs (LI3 and LI4) can be configured with the following functions**:

— **Freewheel stop**: When combined with a braked stop or decelerated stop command, activating the logic input will stop the motor in freewheel mode.

— **External fault**: Enables the starter to detect an external user fault (level, pressure, etc.). When the contact is open, the starter changes to fault mode.

— **Force to local control mode**: If a serial link is used, this function can be used to change from line mode (control via serial link) to local mode (control via the keypad display).

— **Reset motor thermal fault**: Enables the fault to be reset remotely.

— **Activation of the cascade function**: In this case, the motor thermal protection is disabled and relay R1 is configured as the fault isolation relay. Can be used to start and decelerate several motors one after the other with a single starter.

— **Reset all faults**: Enables all faults to be reset remotely.

— **Second set of motor parameters**: Enables a second set of parameters to be selected to start and decelerate two different motors with a single starter.

Assigning the logic inputs with POWERSUITE® on PPC

Logic output application functions

The starter has 2 logic outputs (LO1 and LO2) which, depending on their configuration, can be used for remote indication of the following states or events:

- Motor thermal alarm: The motor thermal state has exceeded the alarm threshold and can be used for example to avoid starting a motor if the thermal reserve is insufficient.

- Motor powered: Indicates that there may be current in the motor.

- Motor overcurrent alarm: The motor current is higher than the threshold set.

- Motor underload alarm: The motor torque is lower than the threshold set.

- Motor PTC probe alarm: The thermal state monitored by the PTC motor probe has been exceeded.

- Second set of motor parameters activated

Relay and analog output application functions

The starter has 3 relays, 2 of which are configurable.

- **End of starting relay R2**: Cannot be configured. The end of starting relay controls the bypass contactor on the starter. It is activated when the motor has completed the starting phase. It is deactivated when a stop command is sent and in the event of a fault. The starter regains control when a braking or deceleration command is sent.

- **Relay R1 application functions**
 Relay R1 can be configured as follows:

  — **Fault relay**: Relay R1 is activated when the starter is powered and there are no faults. It is deactivated when a fault occurs and the motor switches to freewheel mode.

  — **Isolating relay**: The contact of relay R1 closes when a run command is sent and re-opens when a stop command is sent, at the end of deceleration on a decelerated stop or in the event of a fault. The line contactor is deactivated and the motor is isolated from the line supply.

- **Relay R3 application functions**
  Relay R3 is configured to indicate the same states or events as logic outputs LO1 or LO2 (see above).

- Analog current output AO application functions

  — The analog output AO provides an image of the following values: motor current, motor torque, motor thermal state, power factor, active power.

  — The following settings are associated with the analog output:
  - the type of signal supplied: 0-20 mA or 4-20 mA
  - the scale setting of the signal. The function associates the maximum amplitude of the analog output (20 mA) with a percentage of the nominal value of the parameter, which can be set between 50% and 500%.
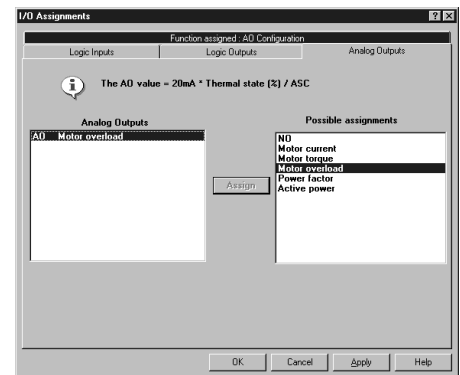
Function Compatibility table

| Functions	Decelerating stop	INTELE™ braking stop	Forced freewheel stop	Thermal protection	Motor phase loss detection	Tests on low power motor	Cascaded motors
Decelerating stop	N/A	N	Y	Y	Y	Y	Y
INTELE™ braking stop	N	N/A	Y	Y	Y	Y	Y
Forced freewheel stop	Y	Y	N/A	Y	Y	Y	N
Thermal protection	Y	Y	Y	N/A	N/A	Y	N
Motor phase loss detection	Y	Y	Y	N/A	N/A	Y	N/A
Tests on low power motor	Y	Y	Y	Y	Y	N/A	N
Cascaded motors	Y	Y	N	N	N/A	N	N/A

Y - Compatible functions   N - Incompatible functions   N/A - Not applicable

ALTISTART® 48 Soft Start
Conventional Starting of Three-Phase Asynchronous Motors

Direct starting
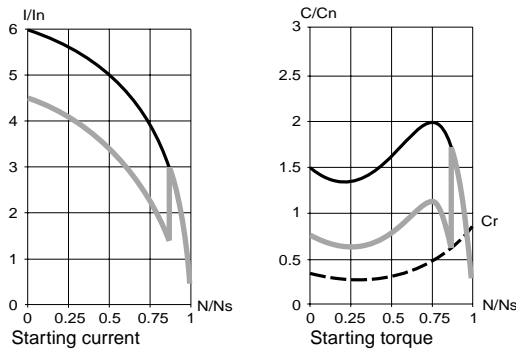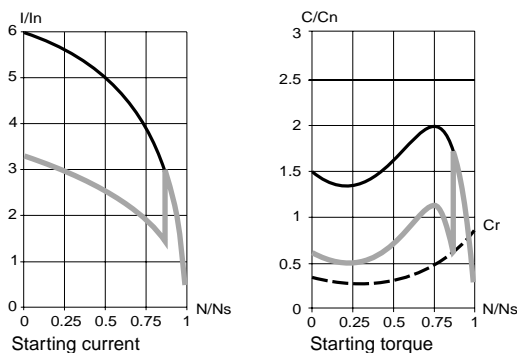

Starting current
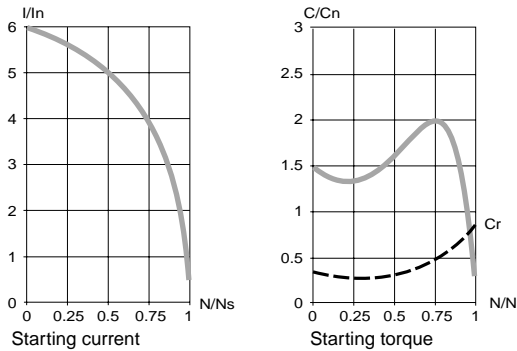
Starting torque

- Starting current: 4 to 8 times the nominal current
- Starting torque: 0.5 to 1.5 times the nominal torque
- Characteristics:
  - Motor with 3 terminals, low and medium power
  - On-load starting
  - High current peak and voltage drop
  - Simple device
  - Sudden starting for the mechanism
- No parameter adjustment

Wye Delta starting

Starting current
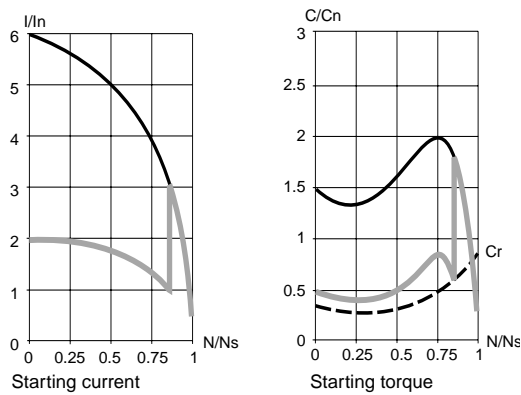
Starting torque

- Starting current: 1.8 to 2.6 times the nominal current
- Starting torque: 0.5 times the nominal torque
- Characteristics:
  - Motor with 6 terminals
  - No-load or low resistive torque starting
  - High current peaks and torque when changing to "star-delta" mode
  - A device requiring maintenance
  - Subject to mechanical stress when starting
- No parameter adjustment

Primary resistor starting

Starting current

Starting torque

- Starting current: 4.5 times the nominal current
- Starting torque: 0.5 to 0.75 times the nominal torque
- Characteristics:
  - Motor with 3 terminals, high power
  - Starting with increasing resistive torque
  - High current peak
  - A large, bulky device requiring maintenance
  - Subject to mechanical stress when starting
- No parameter adjustment

### Autotransformer starting

Starting current

Starting torque

- Starting current: 1.7 to 4 times the nominal current
- Starting torque: 0.4 to 0.85 times the nominal torque
- Characteristics:
  - Motor with 3 terminals, high power
  - Large voltage drop and current peak when connected at full voltage
  - A complex, bulky device requiring maintenance
  - Subject to mechanical stress when starting
- No parameter adjustment

Conventional electronic starting with voltage ramp and current limit
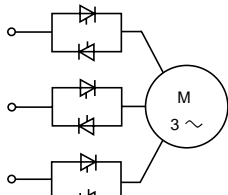
Schematic diagram
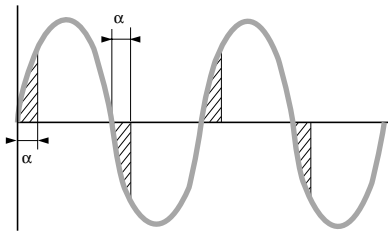
Firing angle

- A controller with 6 thyristors connected head-to-tail in each line phase is used to power the three-phase asynchronous motor by gradually increasing the voltage on start-up.

  — Depending on the firing time and angle of the thyristors, it can be used to supply a voltage which will gradually increase at a fixed frequency.

  — The gradual increase in the output voltage can either be controlled by the acceleration ramp, or by the value of the limiting current, or linked to both parameters.
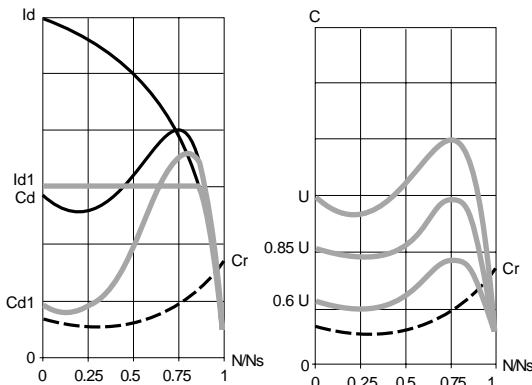

Figure 1

Figure 2

- Figure 1 shows the behavior of the torque in relation to the starting current. Limiting the starting current Is to a preset value Is1 will reduce the starting torque Ts1 to a value which is almost equal to the ratio of the square of currents Is and Is1.

Example

On a motor with the following characteristics: Ts = 2 Tn for Is = 6In, current limiting at Is1= 3 In or 0.5 Is results in a starting torque: Ts1 = Ts x $(0.5)^2$ = 2 Tn x 0.25 = 0.5 Tn.

- Figure 2 shows the torque/speed characteristic of a squirrel cage motor in relation to the supply voltage. The torque varies like the square of the voltage at a fixed frequency. The gradual increase in the voltage prevents the instantaneous current peak on power-up.

Advantages of starting with the ATS48 Soft Start

- **Conventional electronic starting**
  To rectify problems caused by:
  - mechanical stress when starting
  - hydraulic transients during acceleration and deceleration in pump applications
  Conventional electronic starting requires the use of several current limits or the switching of several voltage ramps.
  The settings become complicated and must be modified every time the load changes.

- **Starting with the ATS48 Soft Start**
  The ATS48 controller's torque control enables starting without mechanical stress and the smooth control of hydraulic transients with a single acceleration ramp. The settings are simple and effective, whatever the load.

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